NOTICE

All drawings located at the end of the document.

EG&G ROCKY FLATS

EG&G ROCKY FLATS, INC.
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881 HILLSIDE

RESTORATION

PHASE 1-A

PROJECT MANAGEMENT PLAN,

WORK PROCEDURES,

Q A PROJECT PLANS

FOR

CONSTRUCTION

AND

DRILLING

JUNE 1990

Project Management Plan
for Interim Remedial Action
at the 881 Hillside, Phase 1-A
Operable Unit No. 1

Date 6/6/90
Revision 1

EG&G Rocky Flats, Inc.
Environmental Restoration Program
Rocky Flats Plant, Golden, Colorado

Reviewed for UCNI
TC

"REVIEWED FOR CLASSIFICATION
By
Date 6/6/92

"REVIEWED FOR CLASSIFICATION/UCNI
By B L MILLER (4)

Approvals:

K. B. McKinley, Director
Environmental Restoration — Date: 6/6/90

J. R. Majestic, Director
Health and Safety — Date: 6/8/90

D. W. Ferrera, Director
Support Services — Date: 6/7/90

T. C. Greengard, Manager
Environmental Restoration — Date: 6/6/90

J. P. Koffer, Project Manager — Date: 6/6/90

L. C. Rock, QA Officer — Date: 6/6/90

CONTENTS

1.0 PROJECT BACKGROUND AND SCOPE

This document is the Project Management Plan (PMP) for Phase 1-A Interim Remedial Action (IRA) at the 881 Hillside Area of the Rocky Flats Plant (RFP), Golden, Colorado. This PMP is intended to define the project scope, major milestones, organizational structure, reporting requirements, project documents and key project personnel. This PMP will be revised when significant changes occur.

The RFP, operated by EG&G Rocky Flats, Inc., is a government-owned, contractor-operated facility that began operations in 1951. The RFP is part of the U.S. Department of Energy's nationwide nuclear weapons research, development, and production complex. In the past, both storage and disposal of hazardous and radioactive wastes occurred at on-site locations at the RFP. The 881 Hillside Area has been designated Operable Unit 1 and includes 12 waste sites. These sites were selected for investigation because of the known or suspected soil or groundwater contamination by volatile organic compounds, radioactive elements, heavy metals, and other inorganic compounds. A remedial investigation identified contamination in alluvial groundwater at the 881 Hillside Area.

DOE initiated a multi-phased Interim Measures/Interim Remedial Action (IM/IRA) at the 881 Hillside Area to minimize the release of hazardous substances. The IM/IRA includes design and construction of an interceptor trench to collect the contaminated groundwater and a treatment plant to remove the hazardous substances prior to release or reuse of the treated water. Please refer to the Interim Remedial Action Plan for specific technical and location information. The Interim Remedial Action required for Phase 1-A includes:

- Construction of a concrete pad for a pre-engineered building (to be erected under a separate contract in Phase 1-B of construction) to house treatment equipment.
- Installation of hi-volume air monitoring stations.
- Center-line drilling in French drain locations for geotechnical testing.

The project was initiated on January 15, 1990. Work was temporarily halted on March 26, 1990 at approximately 75% of completion. This PMP addresses the completion of Phase 1-A drilling and construction.

2.0 PROJECT MILESTONES

The completion of major elements of work for the resumption of Phase 1-A activities have been established as milestones. The milestones consider the time phasing and the relationship of the different tasks and serve as a basic management tool for monitoring project progress.

Table 1 presents the milestones that correspond to defined portions of the project schedule.

Table 1

Milestones for Phase 1-A, 881 Hillside Area IRA

Milestone	Date
Compile Documentation Requirements	May 9, 1990
Complete Project Plans and Procedures	May 11, 1990
Perform Pre-Start-Up Readiness Review	May 14, 1990
Obtain EG&G Approval for Start-Up	May 14, 1990
Personnel Training	May 15, 1990
Brief DOE/RFO	May 15, 1990
Brief EPA/CDH	May 21, 1990
Start Drilling	TBD
Installation of Hi-volume air monitoring stations	TBD
Start Pad Construction	TBD + 3 days
Complete Construction	TBD + 2 weeks
Complete Drilling	TBD + 3 weeks

3.0 WORK BREAKDOWN STRUCTURE

The Work Breakdown Structure (WBS) is divided into seven (7) major work scope activities: Project Management, Engineering, Construction, Drilling, Health and Safety, Air Monitoring and Quality Assurance. The functional areas are summarized below.

3.1 PROJECT MANAGEMENT

The Project Manager is assigned from the EG&G Environmental Restoration (ER)Division and reports to the Manager of Environmental Restoration. The Project Manager is responsible for preparing project plans and procedures; directing, controlling and reporting project activities; maintaining construction and health and safety documents; and, communicating project requirements including any modifications to the project scope to the support organizations. Support groups include Facilities Project Management, Environmental Monitoring and Assessment, Environmental Restoration, Facilities Engineering, Health and Safety; and the subcontractors, Garcia Construction and Roy F. Weston, Inc. The Project Manager will also measure project progress, monitor the budget, evaluate project performance, ensure compliance to H&S issues, serve as liaison with DOE/RFO, EPA, and CDH, and has stop work authority. Additionally he will have daily contact and interaction with the appointed DOE Site Manager in accordance with the IAG. The work will be performed under the day-to-day oversight of the EG&G Project Manager according to the project schedule. All work will be performed under applicable health & safety requirements and in compliance with the 881 Phase 1-A Health and Safety Plan. The Project Manager shall have soil moisture testing done daily to ensure adequate soil moisture exists to prevent dust resuspension and on days of earth moving (or other dust generating activities) have dust concentration levels checked during operation.

3.2 ENGINEERING

The Project Engineer is assigned to the project by Facilities Engineering and reports to the Project Manager. The Project Engineer is responsible for procuring the services of an engineering design firm, preparation of engineering design plans and construction specifications (completed for Phase 1-A), preparation of field change orders and any associated plans and specifications as directed by the project manager, and preparation of as-built construction drawings. The geotechnical drilling along the French drain alignment is being performed according to the statement of work prepared by the project engineer. The drilling data are being collected for use in the design of the French drain (IRA Phase II).

3.3 CONSTRUCTION

The Construction Coordinator is assigned to the project by Facilities Project Management and reports to the Project Manager. The Construction Coordinator is responsible for implementing all construction-related project activities including oversight of the construction, ensuring compliance to construction safety requirements, procedures and regulations, and performing construction quality control tests for Phase 1-A of the 881 Hillside Area IRA. All construction activities will be conducted in accordance with EG&G-provided engineering drawings and specifications, Statements of Work and the Contractor's Plan. In addition, the construction coordinator shall determine if soil is moist enough to prevent dust generation, and if necessary require the construction contractor to wet down the area before any additional work is done. He will also determine if the soil is too moist for construction to continue, and stop work if required. The Construction Coordinator shall also watch the site anemometer and stop work according to the Wind Speed Shutdown Criteria.

3.4 DRILLING

The Drilling Project Supervisor is assigned to the project by Environmental Monitoring and Assessment, and reports to the Project Manager. The Drilling Project Supervisor is responsible for procuring the services of an engineering/geologic consulting firm (Roy F. Weston, Inc.) and a subcontracted drilling firm (Boyles Brothers), coordination and supervision of all drilling-related field activities, ensuring compliance to safe drilling practices and preparation of a geotechnical sampling and testing report. The geotechnical report will be provided to the Project Engineer for use in design of Phase II of the IRA.

3.5 HEALTH AND SAFETY

The Health and Safety Coordinator (HSC) is assigned to the project by the Occupational Safety Manager and reports to the Project Manager. The HSC is responsible for coordinating all health and safety-related activities for the project including securing the services of health physicists, industrial hygienists, radiation protection technologists (RPTs) and safety engineers as necessary. The Health and Safety Coordinator will monitor requirements as outlined in the Contractor's Plan (for construction activities) and the site-specific Health and Safety Plan (for drilling activities). The HSC will ensure that radiologic and industrial hygiene measurements are taken, monitor construction and drilling activities for personnel protection and industrial safety considerations, conduct health and safety worksite inspections and document audits, and review all health and safety-related submittal prior to issuance.

All EG&G employees and subcontractors, and their personnel who are assigned to this project are required to have all of the requisite training satisfying 29 CFR 1910 and 1926.

3.6 AIR MONITORING

The Air Programs Representative is assigned to the project by Environmental Monitoring and Assessment (Air Programs) and reports to the Project Manager. The Air Programs group monitors meteorology and air quality for the ER Department. The Air Programs Representative is responsible for operation of Hi-volume air samplers and reporting of air monitoring data. Once air monitoring samples have been analyzed and reduced, they will be reported immediately to the Project Manager. Wind conditions will be reported to the Project Manager, Construction Coordinator, Drilling Supervisor and Health and Safety Coordinator as specified in the work procedures.

3.7 QUALITY ASSURANCE

The Quality Assurance (QA) Officer is assigned to the project by Environmental Restoration (ER)Department Director and reports to the ER Director. The QA Officer is responsible for preparation and implementation of this QA Project Plan, including performing QA surveillance, recommending corrective action to the ER Manager as necessary, reporting on the implementation of corrective actions, and maintaining QA records. The QA Officer is responsible for ensuring that appropriate corrective action is taken and has stop work authority in matters adverse to quality.

4.0 PROJECT BUDGET

The budget for the Phase 1-A, 881 Hillside IRA will be tracked by the Project Administrator. He is assigned to the project by EG&G Facilities Project Management (FPM). The Project Administrator reports to the Project Manager.

5.0 ORGANIZATIONAL STRUCTURE AND KEY PERSONNEL

Figure 1 presents the EG&G functional organizational structure and Figure 2 illustrates the EG&G project management structure for Phase 1-A remedial action work.

6.0 PROJECT REPORTS

Progress and cost reporting of activities relating to the Phase 1A, 881 Hillside Area IRA are the responsibility of the EG&G Project Manager. However, each EG&G functional organization will be responsible for it's own internal tracking and reporting.
Reporting requirements will include:

- Weekly Progress Reports submitted to the Project Manager by the Project Administrator for construction and by the Drilling Supervisor for drilling activities.
- Construction Report including results of quality control tests and as-built drawings.

* Geotechnical Sampling and Testing Report.
* Health and Safety Reports.
* Quality Assurance Reports.

7.0 PROJECT CHANGE CONTROL

A change control methodology has been established for the Phase 1-A, 881 Hillside Area IRA to allow the orderly handling of project changes. All EG&G initiated changes, whether within or outside the project scope of work, will be controlled by change orders handled by the Project Engineer.

8.0 PERSONNEL CHANGES

If key personnel changes are made, the effect of the change on the project deliverable dates and quality will be assessed by the Project Manager. If a significant impact on the project is anticipated, the Project Manager will notify the ER Manager so that EG&G management can take corrective action.

9.0 PROJECT CONTROL DOCUMENTS

The documents that control project activities are listed below:

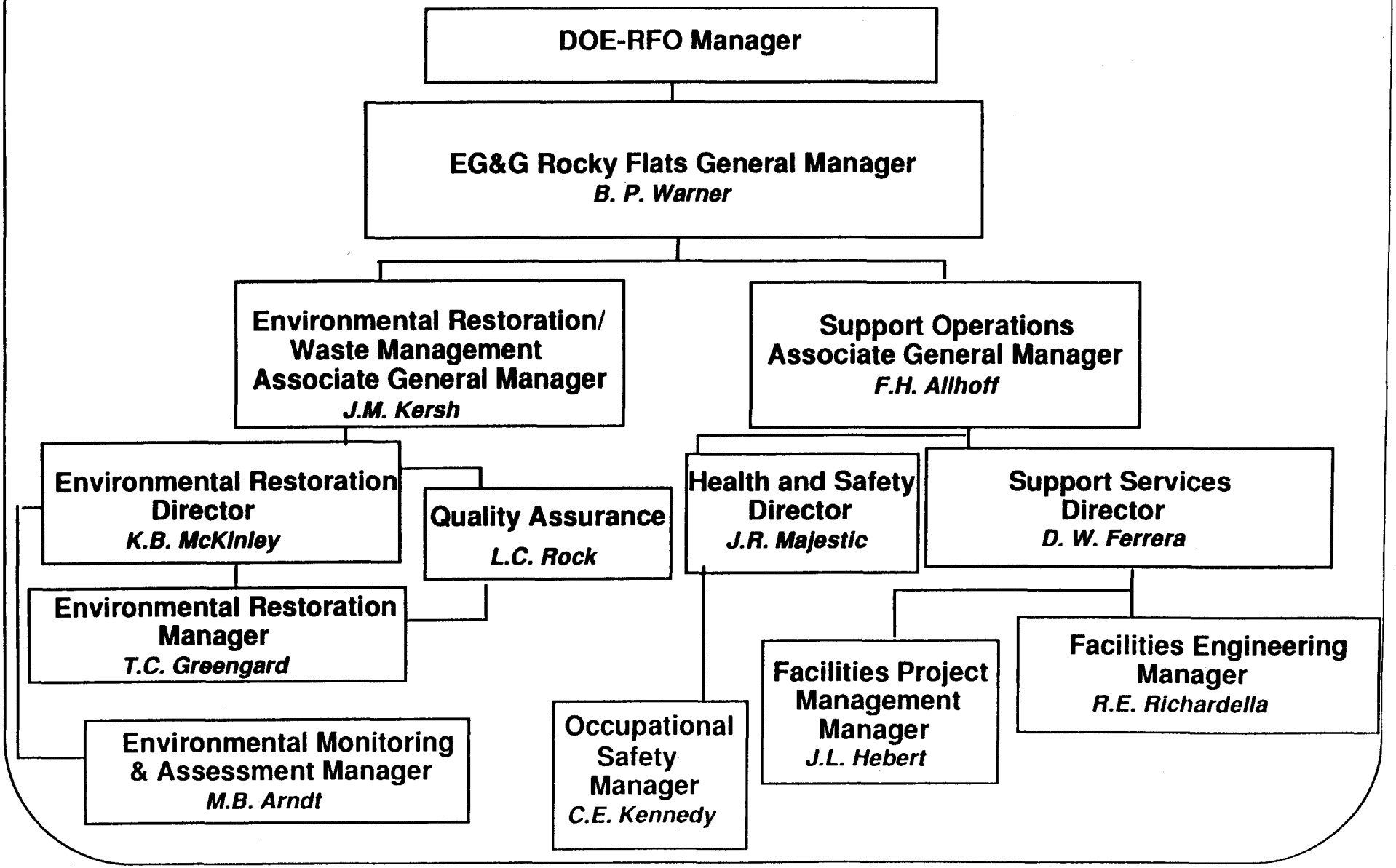
* Interim Remedial Action Plan
* Project Management Plan
* Work Procedures for Drilling and Construction
* Plans and Specifications for Phase 1-A Construction
* Statement of Work and Project Work Plans (drilling)
* ER Standard Operating Procedures
* Quality Assurance Project Plans for Drilling and Construction
* Health and Safety Plan
* Contractor's Plan
* Work Permit
* Excavation Permit

They are located in T130B and at the job site. Drilling, construction, quality assurance and health and safety records will be maintained at T130B and at the job site. The following records will be maintained by the identified document custodian.

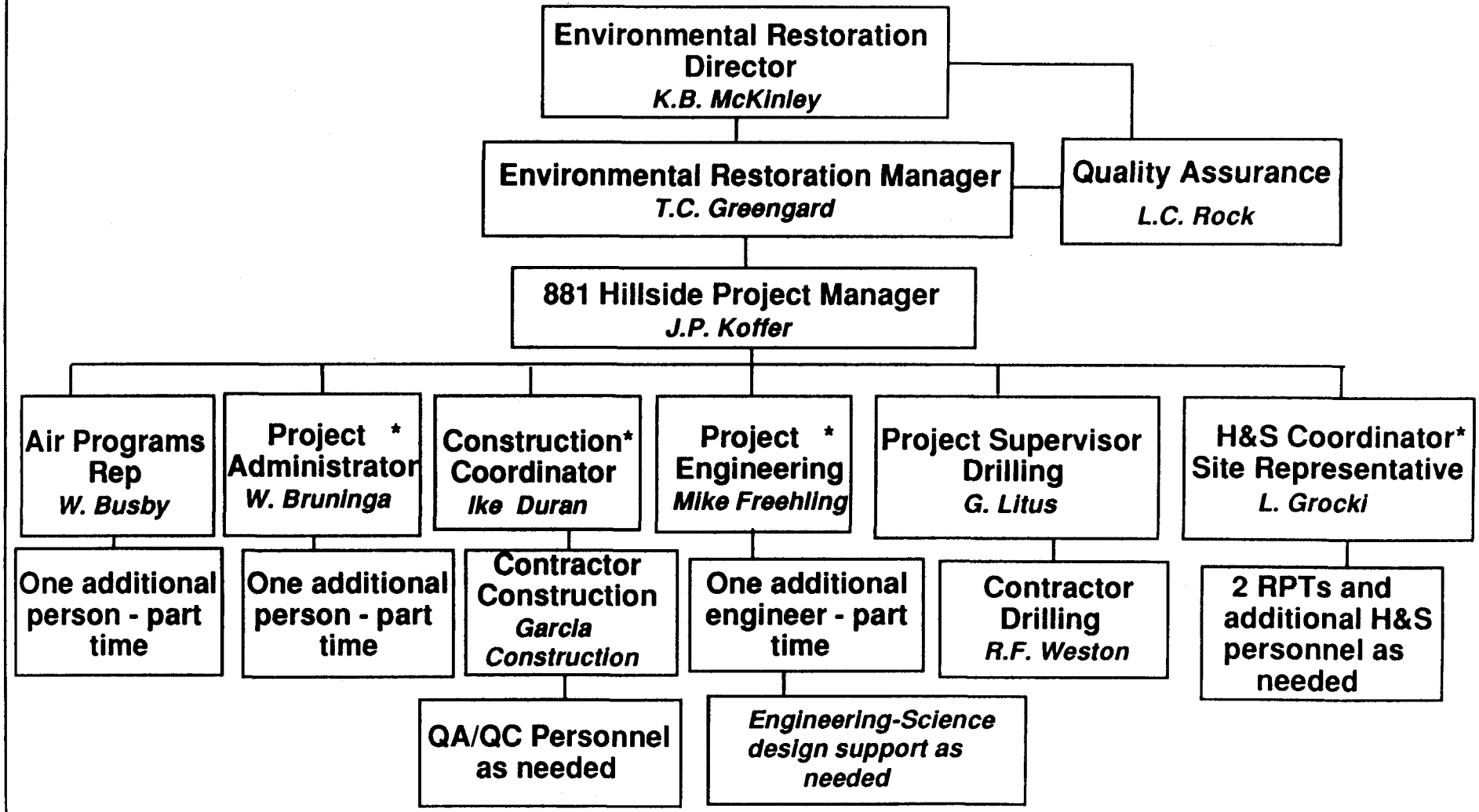
Project Specifications and Drawings, Addendum and Change Orders	Mike Freehling, FE, Bldg. 130
Construction Coordinator's log	Ike Duran, FPM, Bldg. 690E
Project Manager's log	Jim Koffer, ER, Bldg. T130B
QA Audits	Linda Rock, ER, Bldg. T130B
Health and Safety Documentation (Documentation kept at site)	Jim Koffer, ER, Bldg. T130B
Site Entry Log (Log kept at site)	Jim Koffer, ER, Bldg. T130B

Rocky Flats Organization

Involved with 881 Hillside Restoration



Management System
881 Hillside IRA - Phase Ia



* *Denotes persons matrixed to this project from various other directorates*

881 Hillside
Project Management Back-up Listing

Project Manager- Jim Koffer ext 5949	Backup- Tom Greengard ext 7121
Project Administrator- Bill Bruninga ext 5017	Backup- Jay Clawson ext 5023
Construction Coordinator- Ike Duran ext 5268	Backup- Herb Atchison ext 5161
Project Engineer- Mike Freehling ext 7743	Backup- Bob James ext 5006
Drilling Project Coord.- Greg Litus ext 5971	Backup- Nick Demos ext 5951
HS Engr. Site Rep- Larry Grocki ext 2190	Backup- Larry Ross ext 7538
Air Programs Rep - Wanda Busby ext 5603	Backup- Mike Arndt ext 4294
QA Officer - Linda Rock ext 5964	Backup- Karen Schoendaller ext 5968
Security Shift Supt. ext 2914	

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Project Management Plan Dated 5/14/90 Page 1 of 1

Reviewer Name(s): Colorado Department of Health

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1		3.1 Project Management "What is the coordination between DOE and EG&G? Environmental restoration is listed as a support group, but is the managing group."	No change to the project management plan. Note DOE coordination is accomplished by the Project Manager who provides liaison with DOE/RFO, EPA and CDH. Environmental Restoration (ER) is the managing group. In addition, various functions within ER will provide support to the project.

881 Hillside Work Procedures
Construction and Drilling

Approvals:

K.B. McKinley, Dir Env Res

D.W. Ferrera, Dir Sup Ops

J.R. Majestic, Dir H & S

T.C. Greengard, Mngr Env Res

J.P. Koffer, Project Mngr

Rev 1
Date 6/6/90

Reviewed for UCNI

"REVIEWED FOR CLASSIFICATION
By
Date 6/6/90"

"REVIEWED FOR CLASSIFICATION/UCNI
By B. L. MILLER
Date 6-6-90"

881 Hillside Restoration Phase 1A
Construction Work Procedures

Prerequisites

1) All construction personnel must have completed 40 hr OSHA (SARA) training, 24 hr OJT, 8 hr supervisor training (for supervisors only) and any required updates. In addition to this all personnel must have a baseline physical complying with 29 CFR 1910.120.
2) Wind speed must be below 15 MPH for earth moving (or other dust generating) operations to proceed. Refer to Wind Speed Shutdown Criteria in project documents file. All soils shall have moisture content verified to be over 15% before any earth moving activities can take place. Also, air dust concentrations shall be measured as deemed necessary by the Project Management during operations. Soil moisture content and air dust concentrations shall be verified under the Project Manager's direction.
3) Daily safety and plan of the day meetings will be held with the EG&G Construction Coordinator and ER Project Manager.
4) Hi-Vol air samplers must be operational and checked before general construction work can continue. Samplers must be calibrated and deemed operational by the Environmental Monitoring & Assesment/air monitoring group of Environmental Restoration. Samples will be collected twice monthly.
5) The contractor shall be appraised of his liability under the Inter-Agency Agreement.

Required Personnel for this Phase of Construction

construction foreman	health & safety officer
electrician and helper	quality assurance officer
carpenters	concrete workers
heavy equipment operator	

Required Materials for this Phase of Construction

electrical supplies	lumber
concrete forms	concrete
owner furnished equipment (Hi-Vol air samplers)	
reinforcing steel	

Required Documents for this Phase of Construction

weekly work permit	OSHA and orientation training records
excavation permit	records verifying physicals
Contractor's Accident Prevention Plan and JSA	

Required Safety Equipment for this Phase of Construction

hard hats	electrical safety gear
eye/ear/PPE protection (as needed)	
safety shoes or protectors	

881 Hillside Construction
Work procedures

	Work Procedure Description	Reference Document	Prerequisites & Cautions
	Garcia Construction		
_____ 1)	Complete Hi-Vol sampler electrical connections and install misc. hardware as required.	FCO #3, DWGs SK986147-E1 & E2, Rocky Flats Plant Standards SE-103 & 112, Plant Specifications sections 16010, 16050,16402,16450,& 16602.	Health & Safety Plans approved prior to start by Occupational Safety. All personnel must have 40 Hr OSHA training and respirator fit. Non-conducting hardhats must be worn by electrical workers.
_____ 2)	component and S.O. tests on Hi-Vol samplers.		
_____ 3)	Tag and label all circuits,conduits, and panels.		
	EG & G		
_____ 4)	EG&G EMA personnel setup Hi-vol samplers, and wind anemometers.	FCO #3, DWGS SK986147-E1 & E2	Anemometers to be placed as close to construction as possible without interference.
_____ 5)	EG&G personnel monitor systems, report operations.		Calibration and checkout by EG&G personnel.
_____ 6)	EG&G project manager gives Garcia Construction notice to proceed with major construction work.	881 Hillside phase 1A project management plan.	Hi- vol air samplers must be operational before any construction work can start.
	Garcia Construction		
_____ 7)	Complete forming in floor sections 1 & 5.	881 Hillside Phase 1A construction specifications section 03100 concrete formwork, section 03200 concrete reinforcement, section 03300 cast-in-place concrete, section 03600 grout.	heavy equipment traffic dangers. Cap all protruding reinforcing rod ends. Avoid concrete burns by wearing proper protective clothing.
_____ 8)	Set reinforcing steel in floor sections 1 & 5.		
_____ 9)	Pour concrete in floor sections 1 & 5.		

CWP

Work Procedure Description	Reference Document	Prerequisites & Cautions
_____10) Concrete samples for testing taken by ATEC.		
_____11) Form floor sections 2 & 7.		
_____12) set reinforcing steel in sections 2 & 7.		
_____13) Pour concrete in floor sections 2 & 7.		
_____14) Concrete samples for testing taken by ATEC.		
_____15) Form floor sections 3 & 6.		
_____16) Pour concrete in floor sections 3 & 6.		
_____17) Concrete samples for testing taken by ATEC.		
_____18) Complete final grading around foundation.	881 Hillside Phase 1A construction specifications section 02200 earthwork	soil moisture must be verified to be above 15% under the direction of the Project Manager. Soil wetting may be required to prevent dust generation.
_____19) Remove top 12" of soil from electrical trench, replace, and repack to specification. Assist in compaction test as required.		
_____20) Remove weather cover, clean site, and move off of site.	881 Hillside Phase 1A construction specifications section 01500 Temporary Facilities, Controls, and Special Project Requirements, and section. 01600 Material Handling and Control.	Final closeout checklist must be completed.
_____21) Project closeout.		

881 Hillside Drilling
Work Procedures

Prerequisites

1) All field personnel must have completed 40 hour OSHA (SARA) training and any required updates. In addition to this all personnel must have a baseline physical complying with 29 CFR 1910.120, full body count and 24 hours of OJT. Supervisors must have 8 hr OSHA supervisor'training.

2) Wind Speed must remain under 35 mph for general drilling safety. Refer to Drilling Wind Speed Shutdown Criteria in the project work plans (drilling). Access to drilling sites by drilling equipment will be limited, and all vehicals will be walked to the sites by a man on foot.

3) Excavation permits, Work Permits and Land Use Permits must be approved prior to initiating field activities. Refer to the 881 Hillside IRA document for maps showing the area.

4) Health and Safety/Plan of the Day meetings are to be held each morning with the EG&G field supervisor in which field activities are planned.

5) PPE and air monitoring will be performed in accordance with the drilling site-specific Health and Safety plan, as amended, and the ER SOP.

6) Site control zones are not required because drilling sites are outside boundries of SWMU.

7) Contractor shall be appraised of his liabilities according to the Inter-Agency Agreement.

Required Personnel for Drilling Activities

Site Manager
Geologist
Driller
Driller's Helper
Site Health and Safety Officer
Quality Assurance officer

Required Materials for Drilling
Drilling rig
Augers
Split Spoons
Sampling equipment
Decontamination equipment

Required Documentation at Office Trailer
OSHA and Orientation training Verification of physicals
Weekly work permit
Excavation permit
Land use permit
Detailed Statement of work and Project work plan
Project health and safety plan
Site specific Health and Safety Plan

Required Safety Equipment

Hard hats
Eye protection
Safety shoes
Personnel protective equipment as specified in the Project Health and Safety Plan.
a) Coveralls
b) Gloves
c) Respirator and cartridges
d) Monitoring equipment (H-nu and Ludlum test equipment)

WORK SCHEDULE

1. Locations for geotechnical investigations for the overburden are to be investigated in the following sequence. The procedures for the implementation of this task is Procedure "A" (next Pg) Refer to Maps in 881 Hillside IRA for hole locations.

B3-025-90
B3-026-90
B3-027-90
B3-028-90
B3-029-90
B3-030-90
B3-031-90
B3-032-90
B3-033-90
B3-034-90
B3-035-90

2. Locations for the collection of geochemical and geotechnical samples and packer testing are to be collected in the following sequence. The procedure for the implementation of this task is Procedure "B" (next pg).

B3-013-90
B3-017-90
B3-020-90
B3-021-90
B3-022-90
B3-023-90
B3-024-90

PROCEDURE - A

Work Description	Reference Document	Prerequisite and Cautions
_____ 1. Locate Drilling Location.	ER Project Work Plan	
_____ 2. Assess soil moisture.	ER Project Work Plan	In selected areas, soil must be wet prior to initiating work. Planking must be set for soft soil.Surfaces to be level. Proper clearance of subsurface utilities as noted on excavation permit. Overhead utility clearance of 10 feet plus layover of rig.
_____ 3. Setting drilling rig.		
_____ 4. Set up monitoring equipment	Drilling OSA	
_____ 5. Initiate Drilling and Sampling	ER Standard Operating Procedure 4.1, 1.1, 1.6 1.3, 1.4, 1.5,	As specified in HASP ER SOP 6.1, 6.2, 6.3, 6.16
_____ 6. Rig Demobilization	ER SOP 1.6	

PROCEDURE - B

Work Description	Reference Document	Prerequisite and Cautions
_____ 1. Locate Drilling Location.	ER Project Work Plan	
_____ 2. Assess soil moisture.	ER Project Work Plan	In selected areas, soil must be wet prior to initiating work. Planking must be set for soft soil. Surfaces to be level.
_____ 3. Setting drilling rig.		Proper clearance of subsurface utilities as noted on excavation permit. Overhead utility clearance of 10 feet plus layover of rig.
_____ 4. Set up monitoring equipment	Drilling OSA	As specified in HASP
_____ 5. Initiate Drilling and Sampling and packer tests	ER Standard Operating Procedure 4.1, 1.1, 1.6 1.3, 1.4, 1.5, 3.5	ER SOP 6.1, 6.2, 6.3, 6.16
_____ 6. Rig Demobilization	ER SOP 1.6	

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Construction and Drilling Work Procedure (CWP & DWP) Dated 5/14/90 Page 1 of 4

Reviewer Name(s): Colorado Department of Health

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
NA	NA	The RFP has performed alpha surveys of the Hi-Vol air samplers daily from 2/13/90 to 3/30/90. The results are recorded "Background Study" sheets submitted with other documentation to CDH on May 16, 1990. During the technical review portion of our 5-21-90 meeting, an Air Programs representative asserted that this alpha monitoring produces meaningless data which cannot be correlated to real time alpha concentrations in air. EG&G stated that only the radiological analysis performed and reported monthly could provide a quantitative measurement, and that no real time alpha measuring devices or method is available . When asked why the alpha monitoring was performed, EG&G staff stated that it was to satisfy the public. Please clarify....	Note: Alpha monitoring of the Hi-Vol sampler filter paper, as reported in the originally submitted data, is still felt to be meaningless data. It was a feeble attempt, at the request of the public, to provide some type of "real-time" data on alpha concentrations in the air, resuspended by construction. The major problem seen with this type of data is that what is actually causing the alpha count is <u>not</u> the alpha from Pu in the dust. Background counts from naturally occurring concentrations of radon, which varies with the atmospheric pressure, are far greater than those caused by the Pu in the dust. A study was conducted to see how long of an exposure of .03 pci/m^3 it would take for existing detection equipment (Ludlum 12, Hyperpure Germanium, and Fidler) to be able to detect activity on the Hi-Vol filter paper. The shortest was 48 days for the Ludlum 12 instrument, the longest was 130 days with the Fidler detector. Since these times are obviously not "real time," a better method for estimating air concentrations was considered. With the new method proposed, a limit of dust concentration in the ambient air will be set, based on the maximum concentrations of activity in the soil at the site, such that the maximum permissible concentration of .03 pci/m^3 will not be exceeded. This limit was calculated to be 6.25 mg/m^3; the actual limit now imposed is 6 mg/m^3. This will ensure that the resuspended dust will not exceed the maximum

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Construction and Drilling Work Procedure (CWP & DWP) Dated 5/14/90 Page 2 of 4

Reviewer Name(s): Colorado Department of Health

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
			of .03 pci/m^3 during earth moving (or other dust generating activities). The commitment to prevent resuspension of dust during earth moving (or other dust generating activities) is thus covered by three separate shutdown criteria: 1) wind speed shutdown - 15 mph 2) maximum dust concentration - 6.0 mg/m^3 3) minimum of 15% soil moisture for earth-moving or other dust generating activities. This latter criteria is based upon a RFP study showing that resuspension of dust is virtually eliminated when soil moisture is above 15%. Data and calculation for these criteria can be provided to EPA and CDH upon request.

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Construction and Drilling Work Procedure (CWP & DWP) Dated 5/14/90 Page 3 of 4

Reviewer Name(s): Colorado Department of Health

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1	DWP 2	Required Equipment - "must include an HNu and radiation monitoring instrument to determine if health hazard is present."	Added to DWP, p. 2 " d) monitoring equipment (Hnu and Ludlum test equipment)"
2		Required Equipment - "must also list steps for screening of volatiles and radionuclides during construction".	Added "___.4 set up monitoring equipment ...Drilling OSA" to both page DWP 4 and 5. The Drilling OSA outlines the steps for screening of volatile and radionuclides.
1	DWP 3	Work schedules - Location of the drill holes must be shown on a map.	Added to DWP, p. 3 "Refer to maps in 881 Hillside IRA for hole locations."
2	DWP	Work Schedules - "procedure B does not address packer testing"	Added to DWP, p. 5 "and packer tests"
N.A.	DWP 3	A map showing the construction and drilling is necessary or must be referenced.	A Note has been added on page 3 of the DWP "Refer to map in 881 Hillside IRA for hole locations".
1	DWP 1	Baseline physicals for key personnel must include full body counts.	The following note has been add on page 1 of the DWP. "Drillers will have full body counts." Note: Full body counts will not be required for construction workers as work is not in or around the SWMU.
2	CWP 1 CWP 3	Specify criteria for soil wetness that determines shut down operation.	A Note has been added on p. 1 of CWP: "All soils shall have a moisture content verified to be over 15% before any earth moving activities can take place. Soil moisture content shall be verified under Project Manager's direction."

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Construction and Drilling Work Procedure (CWP & DWP) Dated 5/14/90 Page 4 of 4

Reviewer Name(s): Colorado Department of Health

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
DWP 1	DWP 1	Same as comment 1 above - i.e., full body count.	The following note has been added on page 1 of the DWP. "Drillers will have full body counts."

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Construction and Drilling Work Procedure (CWP & DWP) Dated 5/14/90 Page 1 of 3

Reviewer Name(s): United States Environmental Protection Agency

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1	CWP 1	Under item 4 of the prerequisites, it is stated that high volume air samplers will be checked with an alpha scanner at the end of each day when earth moving is done. As this is an attempt to provide qualitative real time analysis of radioactive air monitoring, the alpha scan requirement should have an associated protocol and criteria for use in evaluating this information. For example, how will this information be used? What procedures are in place to compare the information resulting from the alpha scan to background? Under what circumstances will this information be used to shut down the construction or drilling operation?	Note: Alpha monitoring of the Hi-Vol sampler filter paper, as reported in the originally submitted data, is still felt to be meaningless data. It was a feeble attempt, at the request of the public, to provide some type of "real time" data on alpha concentrations in the air, resuspended by construction. The major problem seen with this type of data is that what is actually causing the alpha count is <u>not</u> the alpha from Pu in the dust. Background counts from naturally occurring concentrations of radon, which varies with the atmospheric pressure, are far greater than those caused by the Pu in the dust. A study was conducted to see how long of an exposure of .03 pci/m^3 it would take for existing detection equipment (Ludlum 12, Hyperpure Germanium, and Fidler) to be able to detect activity on the Hi-Vol filter paper. The shortest was 48 days for the Ludlum 12 instrument, the longest was 130 days with the Fidler detector. Since these times are obviously not "real time," a better method for estimating air concentrations was considered. With the new method proposed, a limit of dust concentration in the ambient air will be set, based on the maximum concentrations of activity in the soil at the site, such that the maximum permissible concentration of .03 pci/m^3 will not be exceeded. This limit was calculated to be 6.25 mg/m^3; the actual limit now imposed is 6 mg/m^3. This will ensure that the resuspended dust will not exceed the maximum

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Construction and Drilling Work Procedure (CWP & DWP) Dated 5/14/90 Page 2 of 3

Reviewer Name(s): United States Environmental Protection Agency

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
			of .03 pci/m^3 during earth moving (or other dust generating activities). The commitment to prevent resuspension of dust during earth moving (or other dust generating activities) is thus covered by three separate shutdown criteria: 1) wind speed shutdown - 15 mph 2) maximum dust concentration - 6.0 mg/m^3 3) minimum of 15% soil moisture for earth-moving or other dust generating activities. This latter criteria is based upon a RFP study showing that resuspension of dust is virtually eliminated when soil moisture is above 15%. Data and calculation for these criteria can be provided to EPA and CDH upon request.

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Construction and Drilling Work Procedures (CWP & DWP) Page 3 of 3

Reviewer Name(s): Environmental Protection Agency

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1	CWP 1		Prerequisite 2 has been changed to read "Wind speed must be below 15 MPH for earth moving (or other dust generating) operations to proceed. Refer to Wind Speed Shutdown Criteria in project documents file. All soils shall have moisture content verified to be over 15% before any earth moving activities can take place. Also, air dust concentrations shall be measured as deemed necessary by the Project Manager during operations. Soil moisture content and air dust concentrations shall be verified under the Project Manager's direction." Prerequisite 4 has been changed to read "Hi-Vol air samplers must be operational and checked before general construction work can continue. Samplers must be calibrated and deemed operational by the air monitoring group of Environmental Restoration. Total samples will be collected twice monthly."

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Construction and Drilling Work Procedures (CWP & DWP) Dated 5/14/90 Page 1 of 1

Reviewer Name(s): J. Koffer EG&G

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1	CWP 1	Clarify air monitoring responsibilities in prerequisites No.4	Prerequisite No.4 - changed second and third sentences to read "Samplers must be calibrated and deemed operational by the Environmental Monitoring and Assessment/air monitoring group of Environmental Restoration. Samples will be collected twice monthly."

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Construction Work Procedure (CWP) dated 6/6/90 Page 1 of 1

Reviewer Name(s): Health and Safety

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1	CWP 1	Add 8 hr. supervisor training in prerequisite 1	Prerequisite 1 - Added the following phrase: "8 hr. supervisor training (for supervisors only)"
2	CWP 1	Change reference in prerequisite 2 from "Project Manager" to "Project Management"	Prerequisite 2, third sentence - Changed "Project Manager" to "Project Management"

QUALITY ASSURANCE PROJECT PLAN
for the
INTERIM REMEDIAL ACTION
OPERABLE UNIT 1
881 HILLSIDE, PHASE 1-A
Drilling

ENVIRONMENTAL RESTORATION PROGRAM
ROCKY FLATS PLANT
GOLDEN, COLORADO

Reviewed for UCNI

"REVIEWED FOR CLASSIFICATION/UCNI"
By
Date 6/6/90

"REVIEWED FOR CLASSIFICATION/UCNI"
By B. L. MILLER
Date 6-12-90

QUALITY ASSURANCE PROJECT PLAN
for the
INTERIM REMEDIAL ACTION
OPERABLE UNIT 1
881 HILLSIDE, PHASE 1-A, Rocky Flats Plant
Drilling

POLICY

This Quality Assurance Project Plan identifies and documents the applicable Quality Assurance Requirements that apply to the Rocky Flats Plant Interim Remedial Action for the 881 Hillside, Phase 1A. Drilling work performed on this project must be in compliance with the requirements contained herein.

K.B. McKinley, Director
Environmental Restoration — Date: 6/6/90

J.R. Majestic, Director
Health and Safety — Date: 6/8/90

D.W. Ferrera, Director
Support Services — Date: 6/8/90

Tom Greengard, Manager
Environmental Restoration — Date: 6/6/90

Jim Koffer, Project Manager — Date: 6/6/90

Linda Rock, QA Officer — Date: 6/6/90

TABLE OF CONTENTS

1.0 INTRODUCTION

The Department of Energy (DOE) is implementing an Interim Measures/Interim Remedial Action (IM/IRA) at the 881 Hillside Area (High Priority Sites) of the Rocky Flats Plant (RFP). Pursuant to the Resource Conservation and Recovery Act of 1976 (RCRA) as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA), and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), this interim action is to be conducted to minimize the release of hazardous substances from this area that pose a potential long-term threat to the public health and environment.

An IM/IRA Plan has been prepared to identify, screen, and evaluate appropriate interim remedial action alternatives, and select the preferred interim remedial action for the Area. The IM/IRA Plan has been prepared to conform with the requirements for an Engineering Evaluation/Cost Analysis (EE/CA) as defined in the National Contingency Plan [40 CFR 300.415(b)(4)].

This Quality Assurance Project Plan (QA Project Plan) addresses the specific drilling activities required to provide information needed in the design of the IM/IRA. Drilling will provide data on alluvial and bedrock conditions which will influence the proposed positive cut-off and french drain collection system.

In March 1987, a remedial investigation under the Environmental Restoration (ER) Program [formerly known as the Comprehensive Environmental Assessment and Response Program (CEARP)] began at the twelve sites comprising the 881 Hillside Area. The investigation consisted of the preparation of detailed topographic maps, radiometric, surface geophysical surveys, a soil gas survey, a boring and well completion program, soil sampling and ground and surface water sampling. The results of this remedial investigation are described in the Draft Final Remedial Investigation Report for High Priority Sites (Rockwell International, 1988). A feasibility study was also conducted for the 881 Hillside Area, the results of which are described in the Draft Feasibility Study Report for High Priority Sites (Rockwell International, 1988). Rockwell also prepared detailed responses to EPA comments on the Remedial Investigation (RI) and Feasibility Study (FS) reports. The final RCRA Facility Investigation/Remedial Investigation (RFI/RI) and Corrective Measures Study/Feasibility Study (CMS/FS) reports will address the nature and extent of soils and groundwater contamination, and final remediation of the 881 Hillside Area. These reports will also provide an evaluation of the effectiveness of the IM/IRA.

This QA Project Plan is divided into eighteen sections addressing the details of the plan. These sections address elements outlined in Section 3.2 of the EG&G RFP Quality Assurance Program Plan. All relevant elements of the EPA QAMS-005/80 guidance have been addressed.

The goal of the QA Project Plan is to define procedures that will ensure the quality and integrity of the sample collection, samples, accuracy, and precision of the analysis, representativeness of the results and completeness of the information. Within this document are descriptions of all data quality objectives and procedures associated with sample collection, laboratory analysis, sample custody, initial and continuing instrument/equipment calibration, internal quality control (QC) checks, performance and system audits, preventive maintenance and scheduling, data quality assessment, corrective action and QA reporting to management which are applicable to this project. This QA Project Plan represents a fully integrated QA/QC procedure for EG&G RFP ER and subcontractor activities and as such will be strictly followed. Health and safety considerations are also included in the appropriate sections and will also be strictly followed.

2.0 PROJECT DESCRIPTION

The Project Description section is organized into ten subsections describing the site location, remediation area, land use, topography and geology, site environment, contamination sources, conditions that justify an IRA, remedial action scope, schedule, and compliance with applicable or relevant and appropriate requirements.

2.1 Location and Facility Type

The RFP is located in northern Jefferson County, Colorado, approximately 16 miles northwest of downtown Denver (Figure 2-1). The plant size consists of approximately 6,550 acres of federally owned land in Sections 1 through 4, and 9 through 15, of T2S, R70W, 6th principal meridian. Major buildings are located within an area of approximately 400 acres, known as RFP security area. The security area is surrounded by a buffer zone of approximately 6,150 acres.

The RFP is a government-owned, contractor-operated (GOCO) facility. It is part of a nationwide nuclear weapons research, development, and production complex administered by the Rocky Flats Office (RFO) of the U.S. Department of Energy (DOE). The operating contractor for the RFP is EG&G Rocky Flats, Inc. The facility manufactures components for nuclear weapons and has been in operation since 1951. RFP fabricates components from plutonium, uranium, beryllium, and stainless steel. Production activities include metal fabrication, machining, and assembly. Both radioactive and nonradioactive wastes are generated in the process. Current waste handling practices involve on-site and off-site recycling of hazardous materials and off-site disposal of solid radioactive materials at other DOE facilities.

The RFP is currently regulated under the Colorado Hazardous Waste Act (CHWA) for treatment, storage, and corrective action, an interim status RCRA hazardous waste treatment/storage facility. In the past, both storage and disposal of hazardous and radioactive wastes occurred at on-site locations.

Preliminary assessments conducted under Phase 1 of the ER Program identified some of the past on-site storage and disposal locations as potential sources of environmental contamination.

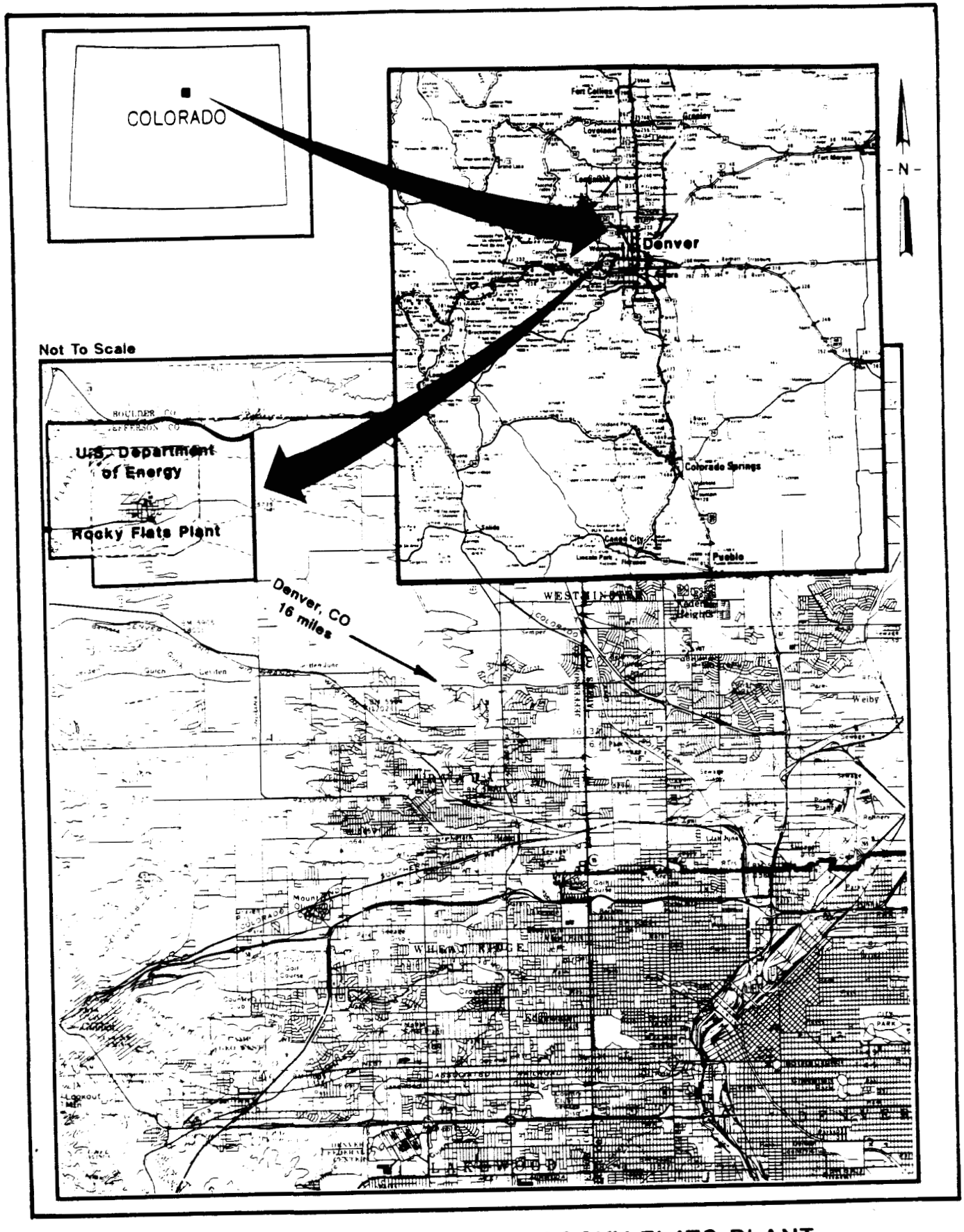


FIGURE 2-1 LOCATION OF ROCKY FLATS PLANT

2.2 Site Conditions That Justify An IRA

There is no immediate threat to the public health and environment posed by groundwater contaminants at the 881 Hillside Area because the affected water is contained within the plant boundary. However, an unacceptable risk would be posed to the public by consumption of the contaminated alluvial groundwater at or immediately downgradient of the 881 Hillside Area. Although consumption of this water is not likely, an IM/IRA will be implemented in order to prevent further contaminant migration from the 881 Hillside Area that could otherwise exacerbate final cleanup efforts at the site.

The airborne radionuclide contaminants detected at Hillside 881 do not pose an immediate threat to the public health and environment. The continuous ambient air monitoring network indicates no airborne radionuclide contamination at the 881 Hillside above background. There is no immediate threat to public health and the environment.

2.3 Determination of Remedial Action Scope

The overall objective of the IM/IRA Plan at the 881 Hillside Area is prevention of release and migration of alluvial groundwater contaminants downgradient, and the cleanup of alluvial groundwater contamination to within acceptable levels. The effort is to be performed in the interest of protecting public health as well as the environment.

Specific objectives of the IM/IRA Plan are:

- Contain, reduce, and/or eliminate site contaminants identified as posing potential threats to human health or the environment. This must be consistent with the final remedy at the site.
- Reduce or eliminate exposure to site contaminants for potential receptors by controlling potential contaminant pathways.
- Demonstrate technical feasibility, environmental and cost effectiveness of the interim remedial action.
- Demonstrate compliance with the Clean Air Act by providing air monitoring and meteorological data during IM/IRA activities.

2.4 Interim Remedial Action Activities

Activity

IM/IRA Plan

Draft IM/IRA Plan
EPA/CDH Review
Proposed IM/IRA Plan
IM/IRA Plan Public Review
Respond to Public Comments and
Finalize Plan

Design

Building Foundation & Slab (Phase I)
Tanks
UV/Peroxide Treatment System
Ion Exchange System
Building and Tank Foundations
(Phase II)14
Subsurface Investigation
Collection System

Procurement

Influent Storage Tanks
UV/Peroxide System
Effluent Storage Tanks
Ion Exchange System

Construction

Building Foundation and Slab
Construction Contracting
Building Foundation and Slab
Construction

Building and Tank Foundations
Construction Contracting
Building and Tank Foundations
Construction
Treatment System Construction Contracting
Treatment System Construction

Groundwater Collection and Treatment*
Drain Collection System Construction
Contracting
Drain Collection System Construction
Drain Water Collection and Treatment
(complete system)

*Groundwater will be withdrawn from a well at SWMU 119.1 and treated as part of startup and testing.

3.0 PROJECT ORGANIZATION

This section describes the role of EG&G RFP personnel and subcontractor's personnel in the IM/IRA Plan for 881 Hillside operable unit activities.

3.1 881 Hillside Project Organization

The QA and Management Organization for this project is illustrated in Figures 3-1 and 3-2**. EG&G RFP personnel will provide the primary project management and QA oversight. Roy F. Weston will be primarily responsible for drilling and sampling activities.

3.2 Responsibilities of Key Participants

The duties of all key personnel associated with this project are presented in this section. All key personnel are listed in Figure 3-2 of this section.

3.2.1 *Environmental Restoration Department Director*

The ER Department Director is responsible for the overall direction of the ER, Environmental Monitoring and Assessment, Clean Water, Clean Air, and National Environmental Policy Act (NEPA) functions of the ER Department. In addition, the ER Department Director is directly responsible for the QA functions for the Department. The ER QA Officer reports directly to the ER Department Director. The ER Department Director will have overall authority to stop work.

3.2.2 *Environmental Restoration Division Manager*

The ER Division Manager is responsible for implementing ER-related construction activities, QA project plans, corrective actions as necessary, and for providing overall directions and guidance to the Project Manager. The ER Division Manager will have stop work authority.

3.2.3 *881 Hillside Project Manager*

The Project Manager is assigned from the EG&G ER Division and reports to the Manager of ER. The Project Manager is responsible for preparing project plans and procedures, directing, controlling and reporting

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**NOTE: The Construction Coordinator, contractor construction and QA/QC personnel are illustrated to show the organization for the overall project. They are not active for this drilling activity.

Figure 3-1

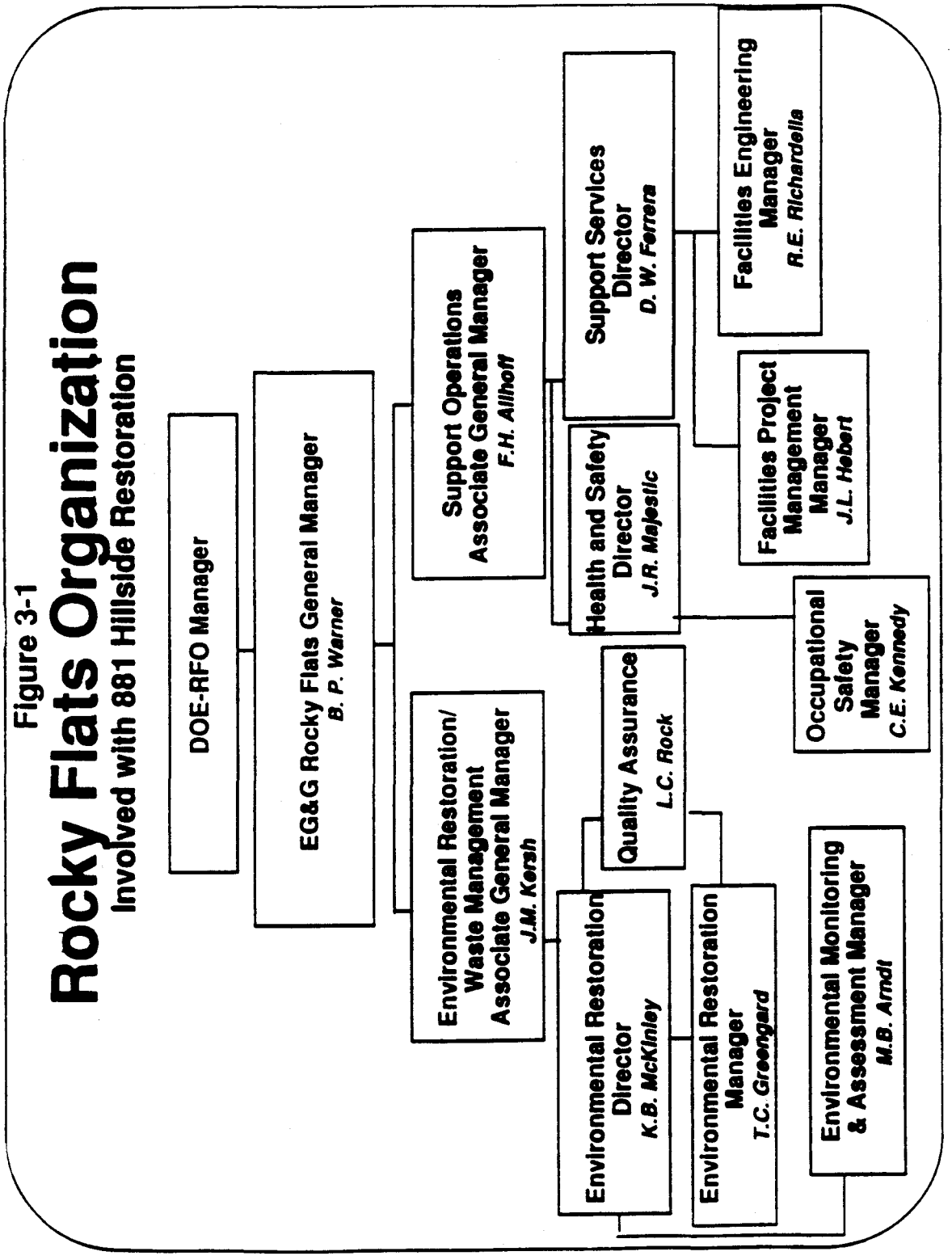
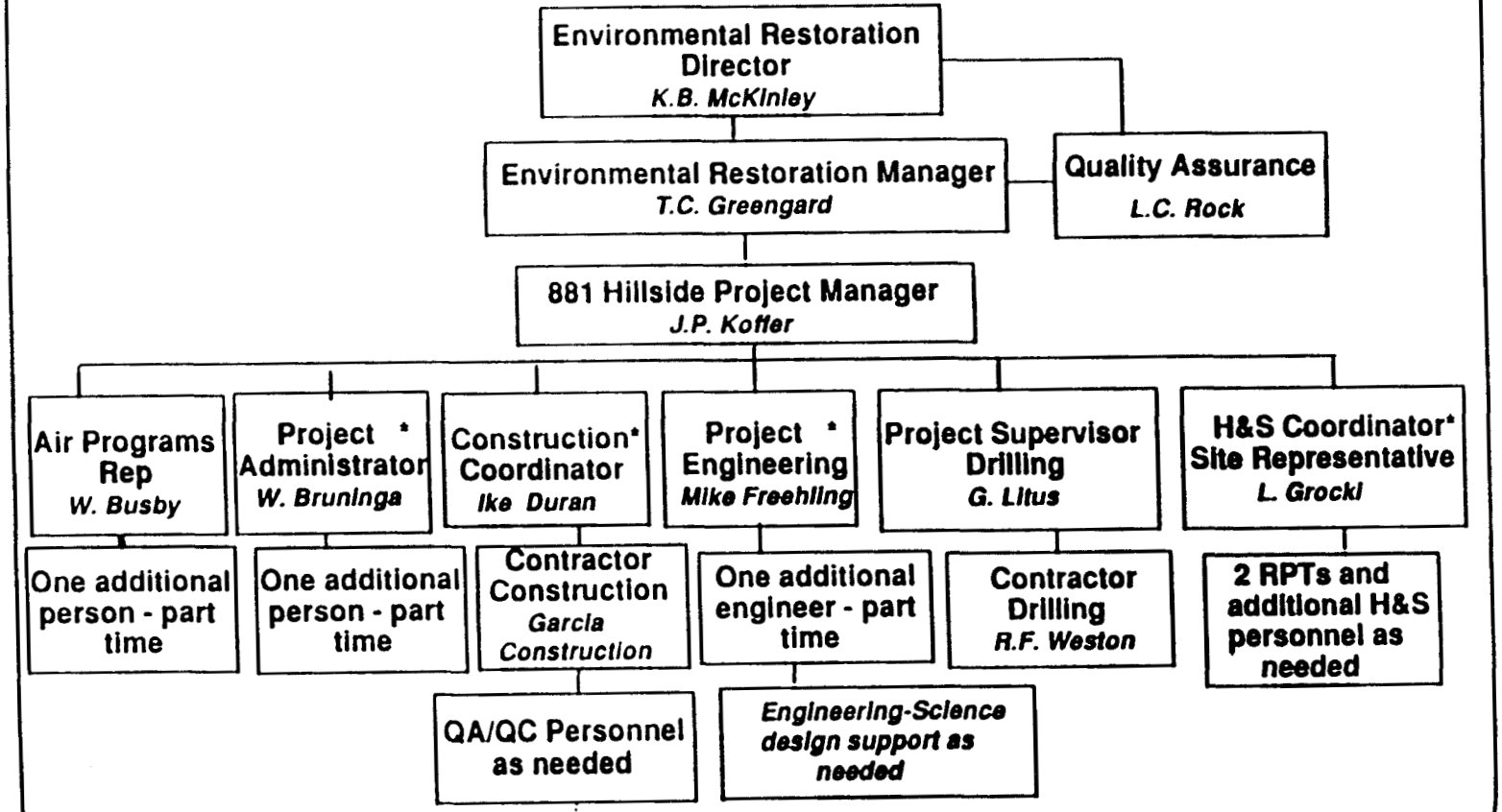

Rocky Flats Organization
Involved with 881 Hillside Restoration
DOE-RFO Manager
EG&G Rocky Flats General Manager
B. P. Warner
Support Operations
Associate General Manager
F.H. Allhoff
Support Services
Director
D. W. Ferrera
Facilities Engineering
Manager
R.E. Richardella
Environmental Restoration/
Waste Management
Associate General Manager
J.M. Kersh
Health and Safety
Director
J.R. Majestic
Facilities Project
Management
Manager
J.L. Hebert
Environmental Restoration
Director
K.B. McKinley
Quality Assurance
L.C. Rock
Occupational
Safety
Manager
C.E. Kennedy
Environmental Restoration
Manager
T.C. Greengard
Environmental Monitoring
& Assessment Manager
M.B. Arndt

Figure 3-2

Management System

881 Hillside IRA - Phase Ia



* Denotes persons matrixed to this project from various other directorates

project activities; maintaining health and safety documents; and, communicating project requirements including any modifications to the project scope to the support organizations. Support groups include: Facilities Project Management, Environmental Monitoring and Assessment, Environmental Restoration, Facilities Engineering Health and Safety, and the subcontractor Roy F. Weston Inc. The Project Manager will also measure project progress, monitor the budget, evaluate project performance, ensure compliance with health and safety issues and serve as liaison with DOE/RFO, EPA, and CDH; and will have stop work authority. Additionally, he will have daily contact and interaction with the appointed DOE Site Manager in accordance with the Interagency Agreement (IAG). The work will be performed under the day-to-day oversight of the EG&G 881 Hillside Project Manager according to the construction project schedule. All work will be performed under applicable health and safety requirements and in compliance with the 881 Phase 1-A Health and Safety Plan. The Project Manager shall have soil moisture testing done daily to ensure adequate soil moisture exists to prevent dust resuspension and on days of earth moving (or other dust generating activities) have concentration levels checked during operation.

3.2.4 *H&S Site Coordinator*

The Health and Safety Coordinator (HSC) is assigned to the project by Health and Safety. He reports to the Project Manager. The HSC is responsible for coordinating all health and safety-related activities of the project including securing the services of health physicists, industrial hygienists, radiation protection technicians, (RPTs) and safety engineers as necessary. The performance based training department will provide health and safety-related training as necessary to EG&G employees and subcontractor personnel. The HSC will monitor requirements as provided in the H&S Plan. The HSC will ensure that radiologic and industrial hygiene measurements are taken, monitor drilling activities for personnel protection and industrial safety considerations, and will have stop work authority.

3.2.5 *Air Programs Representative*

The Air Programs Representative is assigned to the project by Environmental Monitoring and Assessment (Air Programs) and reports to the Project Manager. The Air Programs group monitors meteorology and air quality for the ER Department. The Air Programs Representative is responsible for operation of Hi-volume air samplers and reporting of air monitoring data. Once air monitoring samples have been analyzed and the data has been reduced, it will be reported immediately to the Project Manager. Wind conditions will be reported to the Project Manager, Construction Coordinator, Drilling Supervisor, and HSC as specified in the work procedures.

3.2.6 *Quality Assurance Officer*

The Quality Assurance Officer (QAO) is assigned to the project by the ER Department Director and reports to the ER Department Director. The QAO is responsible for preparation and implementation of this QA Project Plan. The QAO is also responsible for performing QA surveillance, recommending correction to the ER Manager as necessary, reporting on the implementation of corrective actions, and maintaining QA records. The QAO is responsible for ensuring that appropriate corrective action is taken and has stop work authority in matters adverse to quality.

3.2.7 *Drilling Project Supervisor*

The Drilling Project Supervisor is assigned to the project by Environmental Monitoring and Assessment and reports to the Project Manager, and will be the primary contact between the Drilling Contractor, the 881 Hillside Project Manager, and the QAO on any technical or contractual matter. The Drilling Project Supervisor will control drilling activities to ensure quality planning, execution, and delivery of drilling-related products. The Drilling Project Supervisor will be responsible for monitoring and verifying any problems requiring corrective action and compliance with H&S requirements and will have stop work authority.

4.0 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are defined as qualitative and quantitative statements of the quality of data needed to support specific decisions or actions. The DQOs for the RFP ER Department are primarily related to remedial investigations, feasibility studies, remedial action, remedial action performance assessment, and surface water and groundwater monitoring activities.

The success of these activities depends on the decisions made, actions taken, and determining if the quality of the data is compatible with the requirements of the decision-making. One measure of success is the extent to which the DQOs for these activities are achieved. Establishing useful and attainable DQOs depends on identifying the following elements:

- Data Users (the decision-makers and end-users of the data).
- Purposes for Collecting Data (intended uses of the data).
- Data Types (data classifications that are needed).
- Sampling and Analytical Options (available alternatives).
- PARCC (precision, accuracy, representativeness, comparability, and completeness), Parameters (levels of data quality that are needed to meet PARCC requirements).

Each of these elements is discussed in the sections that follow.

4.1 Data Users

The data users consist of decision-makers, program management staff, and technical personnel. For the RFP ER Department, these users are defined below.

4.1.1 *Decision Makers*

The principal decision-makers are identified as the federal officials responsible for RFP operations and the federal and state regulatory officials responsible for environmental protection.

4.1.1a *U.S. Environmental Protection Agency Region VIII (EPA-Denver)*

The EPA-Region VIII group overseeing environmental restoration activities at the RFP is the Waste Management Division. The identified decision-makers are the Waste Management Division Director, RFP Remedial Project Manager (RPM), and RCRA and CERCLA Branch Chiefs.

4.1.1b *State of Colorado Department of Health (CDH-Denver)*

The CDH group overseeing the Environmental Restoration Program at the RFP is the Hazardous Materials and Waste Management (HMWM)

Division. The identified decision-maker is the HMWM Division Director, the Hazardous Waste Section Leader, and the Unit Leaders of the Hazardous Waste Facilities Unit and the Monitoring and Enforcement Unit.

4.1.1c *U.S. Department of Energy - Office of Environmental Restoration and Waste Management*

The DOE is identified as the owner of the RFP and the lead Federal agency responsible for operation of the facility. The DOE-Office of Environmental Restoration and Waste Management, is charged with coordinating ER Programs conducted at DOE facilities under its jurisdictions. The identified decision-makers are the Secretary of Energy and the Acting Assistant Secretary for Environmental Restoration and Waste Management.

4.1.1d *U.S. Department of Energy - Rocky Flats Office (RFO)*

The DOE/RFO is charged with supervising the ER Program at the RFP. The identified decision-makers are the DOE/RFO Deputy Manager, the Acting Assistant Manager for Environmental Management, and the Acting Environmental Restoration Branch Chief.

4.1.2 *Program Management Staff*

The principal program management staff are identified as the prime contractor personnel responsible for ER activities and ensuring compliance with environmental protection regulations at the RFP.

4.1.2a *EG&G Rocky Flats Plant Environmental Restoration Department*

The EG&G RFP ER Department has primary responsibility for planning and implementation of ER projects at RFP. The identified data users are the Associate General Manager for Environmental Restoration and Waste Management, the ER Department Director, ER Department Division Managers, ER Project Managers, and matrixed project personnel from other RFP or external EG&G organizations.

4.1.3 *Technical Personnel*

The principal technical personnel are identified as the EG&G RFP technical specialists responsible for supervising, coordinating, and performing ER Department and/or ER Division activities.

4.1.3a *EG&G Rocky Flats Plant ER Department and Subcontractors*

Technical specialists from the EG&G RFP ER Department, other EG&G groups, and subcontractors are assigned to coordinate, perform,

and supervise sampling, analysis, reporting, and other activities related to ER Department projects. The data users identified as technical personnel are the Technical Specialists.

4.2 Purposes for Collecting the Data

The primary purpose for collecting environmental measurement data specified in this QA Project Plan is in support of IM/IRA design of the positive cut-off and French Drain system, and as required to ensure protection of the site workers as outlined in the H&S Plan.

4.3 Data Types

There are five classes of data needed to support this interim remedial action project. These five classes are:

- Hydrogeologic Data
- Organic Chemistry
- Inorganic (Metals) Chemistry
- Major Ion Chemistry
- Radiochemistry
- Air Quality
- Geotechnical

Specific measurement data needed for each of the five classes are described below.

4.3.1 *Hydrogeologic Data*

Hydrogeologic data is needed primarily for determining geologic and hydrologic characteristics of the RFP site and specific site areas under investigation.

Geologic data is obtained from geologic mapping, drilling, and geophysical logging activities. Hydrologic data is obtained from hydrologic mapping, well installation, well completion, and surface water measurement activities. Data collected during these activities are recorded in logging formats prescribed in subcontractor technical specification documents and according to project Work Plans and Standard Operating Procedures (SOPs).

Borehole sampling activities require collection and documentation of the following data during sampling:

Borehole Numbers and Locations
Dates & Times Sampled
Field Measurements
pH
Specific Conductance
Weather Conditions
Sample Transfers to Laboratory (Dates/Times)
Name of Sample Collector
Comments/Observations During Sampling
Samples Collected
Parameters Collected
Preservatives Used/Filtering
Sampling Methods
Equipment Numbers Used
Trip Blanks and Field Blanks Used
Sources of Trip and Field Blanks

4.3.2 *Organic Chemistry*

Organic chemistry data needed consists of the compounds on EPA's Contract Laboratory Program (CLP) Target Compounds List (TCL). Analyses for TCL organics are essential because some of these compounds have been identified in groundwater, surface water, and soil samples collected during Phase I RI studies. These analyses are needed for comparison of CERCLA site and RCRA closure unit data with Applicable or Relevant and Appropriate Requirements (ARARs). Organic chemistry analyses are performed in accordance with the USEPA CLP-Statement of Work (SOW) for Organic Analyses, 2/88.

4.3.3 *Inorganic (Metals) Chemistry*

Soil, groundwater, and surface water will be analyzed for the CLP Inorganic Target Analyte List (TAL). In addition to the target analytes, analyses for the following metals are also needed:

Cesium
Molybdenum
Strontium
Tin
Lithium

These analyses are necessary to define transport phenomena, to evaluate aquifer continuity, and for comparison with EPA and CDH ARARs. Inorganic analyses are done in accordance with USEPA CLP-SOW for Inorganic Analysis (7/88). Filtered and unfiltered surface water samples will be analyzed for metals (TAL metals and five additional metals above). Groundwater samples are to be analyzed for filtered metals only.

4.3.4 *Other Water Quality Parameters*

Analyses needed for other water quality parameters include the following:

Bicarbonate
Carbonate
Chloride
Nitrate as N
Sulfate
Sulfide
Total Dissolved Solids
Total Suspended Solids
Dissolved Oxygen

Major ion analyses are used to define and characterize water quality in groundwater and surface waters. There are no EPA CLP methods for major ion analyses. The EPA SW-846 methods, EPA Methods for the Chemical Analysis of Water and Wastes, and Standard Methods for Wastewater Analyses will be used. Groundwater and surface water samples will not be filtered prior to analysis of these parameters.

4.3.5 *Radiochemistry*

Radiochemistry analyses are needed for soil, groundwater, and surface water samples. The following radionuclide analyses are needed:

$Plutonium^{239+240}$
$Americium^{241}$
$Uranium^{233+234}$
$Uranium^{238}$
$Uranium^{235}$
Tritium
$Strontium^{89+90}$
$Cesium^{137}$
Gross Alpha
Gross Beta
$Radium^{226}$
$Radium^{228}$

These analyses are needed for comparison with EPA and CDH ARARs and RFP background data. In some cases, the RFP background concentrations are lower than ARAR values. There are no CLP methods available for conducting these analyses. Standard analytical methods that meet all QC requirements and minimum detectable limits have been chosen for these analyses. All surface water samples are to be analyzed for filtered and non-filtered radionuclides. Groundwater samples are to be analyzed for filtered radionuclides only.

4.3.6 *Air Quality*

Radioactive ambient air data are required for air monitoring samples. Radiochemistry analyses are needed for radioactive ambient air samples.

These analyses provide data for compliance under Clean Air Act (CAA) and address the ARARs. Methods employed for analysis are not available under CLP, and have been developed by the document called EG&G Procedures which contain Standard Operating Procedures (SOPs) for the ambient air analyses. A QA/QC manual is available for the meteorological procedures.

4.3.7 *Geotechnical*

Data needed to determine the existing geotechnical conditions at the proposed locations of the French drain and influent/effluent lines are as follows:

1. Classification of the soil and bedrock for engineering purposes.

2. Shear strength of the soil and bedrock.

3. Unconfined compressive strength of the soil.

4. Permeability of the soil and bedrock.

These data will provide the information necessary for the proper design and construction of the French Drain and influent/effluent lines.

4.4 PARCC Parameters

The PARCC parameters consist of precision, accuracy, representativeness, comparability, and completeness. The specific objectives associated with each of these parameters are dependent on the intended use(s) of the data. Specific objectives are described in sampling and analysis plans prior to initiating any sampling or analysis activities.

For RFP ER Department projects, environmental data collected must conform to the following criteria:

- Data must be of known and documented quality.

- Data must be obtained in accordance with rigorous, documented, QA/QC criteria.

- Data may originate from sampling and analysis of non-conventional parameters. Radionuclide analyses are examples of non-conventional parameters.

- Data obtained from analyses are characterized by low detection limits and method-specific detection limits.

Where available, CLP methods and protocols are used. Methods and associated detection limits are selected such that data may be compared with federal and state ARARs and/or RFP background concentration values.

- Data is reviewed and validated independent of the laboratory according to validation procedures prescribed by EPA and/or DOE where applicable and available. Data validation guidelines for radiochemistry are not available through either of these agencies and thus such guidelines were developed internally. Review and validation activities are documented. Data is not used until it has been reviewed and its validity determined. Data validity in the ER Department has three classifications: Valid, Acceptable with qualifications, and Rejected.

The overall project goals for sampling and analysis include the following:

- To identify and quantify any releases of contaminants into the environment resulting from RFP activities.
- To obtain defensible data of known and documented quality to satisfy the needs of the decision-makers and data users, and that satisfy interim project objectives. Data and documentation needs to be of sufficient quality to withstand legal, public, and regulatory scrutiny.
- One-hundred percent sample data used in this project will be reviewed and validated.

These goals are formulated as DQOs in terms of the PARCC requirements described below.

4.4.1 *Accuracy*

Accuracy refers to the degree of difference between measured or calculated values and the true value. The closer the numerical value of the measurement comes to the true value, or actual concentration, the more accurate the measurement. One of the measures of analytical accuracy is expressed as the percent recovery of an analyte which has been added to the environmental sample at q known concentration before analysis. Accuracy will be determined from the results of matrix spike analyses performed at the rate of one set every 20 samples. The equation used to calculate percent recovery is:

$$\text{Accuracy} = \text{Percent recovery} = \frac{A_r - A_o}{A_f} \times 100 \text{ percent}$$

where:

A_r = Total amount found in spiked sample
A_o = Amount found in unspiked sample
A_f = Amount added to sample

The accuracy of simple, yet fundamental field analyses is difficult to assess quantitatively. Sampling accuracy can be maximized, however, by the adoption and adherence to a strict QA program. Specifically, all procedures will be documented as standard protocol and all equipment and instrumentation will be properly calibrated and well maintained. Trip blanks, ambient condition blanks (field blanks), and equipment decontamination washes will be included in all sample batches to ensure that all samples represent the particular site from which they were sampled and to assess any cross-contamination that may have occurred. In addition to equipment operating procedures, a high level of accuracy will be maintained by thorough and frequent review of field procedures. In this manner, deficiencies will be quickly documented and corrected.

4.4.2 *Precision*

Precision refers to the reproducibility or degree of agreement among replicate measurements of a single analyte. The closer the numerical values of the measurements are to each other, the more precise the measurement. One of the measures used to estimate the precision of a method is the standard error of the estimates for the least square regression line of "measured" vs. "target" concentrations. The primary role of this application is to characterize the precision of any analysis method under specified conditions. This allows immediate comparison of precision of different results produced by the same method. Analytical precision for a single analyte is expressed as a percentage of the difference between results of duplicate samples and matrix spike duplicates for a given analyte. Precision will be determined from the results of duplicate and matrix spike duplicate analyses performed at the rate of one set every 20 samples. Relative percent difference is calculated as:

$$\text{Precision} = \text{Relative Percent Differences} = \frac{C_1 - C_2}{\frac{C_1 + C_2}{2}} \times 100 \text{ percent}$$

where:

C_1 = Concentration of the analyte in the sample or matrix spike duplicate
C_2 = Concentration of the analyte in the duplicate/replicate or matrix spike duplicate

During the collection of data using field methods and/or instrumentation, precision is checked by reporting several measurements taken at one location and comparing the results. Precision will be reported as the relative percent difference for two results and as the standard deviation for three or more results. Sample collection precision will be measured in the laboratory with the analysis of field replicates and laboratory duplicates.

4.4.3 *Completeness*

Completeness is expressed as the percentage of valid or acceptable data obtained from a measurement system. For data to be considered valid, it must meet all the acceptance criteria including accuracy, precision, and any other criteria specified by the analytical method used. Field sampling conditions are unpredictable and non-uniform. The objective of the field sampling program is to obtain samples for all analyses required at each individual site, provide sufficient sample material to complete those analyses, and to produce QC samples that represent all possible contamination situations; i.e., contamination during sample collection, transportation, and storage.

The overall data quality objective for completeness during this investigation is 90 percent. For data points considered critical to the investigation, the data quality objective for completeness is 95 percent. Critical data points for the project will be determined by the Project Manager prior to each applicable field activity. The equation used to calculate percent completeness is:

$$\text{Completeness} = DP_v = \frac{DP_t - DP_i}{DP_t} \times 100$$

where:

DP_v = Valid or acceptable data points
DP_i = Invalid data point (sum of the percent recovery or RPD values outside project or laboratory control limits and number of contaminants in blank samples)
DP_t = Total number of QC data points (each VOC analysis is equal to 37 data points, each semivolatile analysis is equal to 65 data points, each metals analysis is

equal to 33 data points, each field and inorganic analysis is equal to 1 data point)

4.4.4 *Representativeness*

Representativeness is defined by the degree to which the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. If the same results are reproducible, the data obtained can be said to represent the environmental condition. Representativeness is ensured by collecting sufficient samples of an environmental medium, properly chosen with respect to place and time. The methods and protocols used to select samples that are representative of a particular sampling site are described in the SOP Section used for this project.

4.4.5 *Comparability*

Comparability is defined by the confidence with which one data set can be compared to another. Field and laboratory procedures greatly affect comparability. To optimize comparability, only the specific methods and protocols that have been selected or specified as appropriate for this project will be used to collect and analyze samples for this project. By using specific sampling and analysis procedures, all data sets will be comparable at each specific site at RFP and between sites.

5.0 FIELD OPERATIONS AND SAMPLING PLAN

All field operations are conducted using methods described in Standard Operating Procedures, Environmental Restoration Program, Rocky Flats Plant (1/89). These procedures are located in and available from the QA Records File and will be utilized for field operations, data collection, and sampling.

The procedure sections to be utilized on this project are presented in Table 5-1.

Table 5-1

Standard Operating Procedures (Field Operations)

Section	Purpose
1.1	General Instructions for Field Personnel
1.2	General Surface Geophysics
1.3	Sample Control and Documentation
1.4	Sample Containers and Preservation
1.5	Handling, Packaging, and Shipping
1.6	Equipment Decontamination
1.8	Personnel Decontamination - Level D
1.9	Personnel Decontamination - Level C
4.0	Drilling and Logging
5.0	Soil Sampling
6.0	Health and Safety

The bedrock lithology and hydraulic conductivity will be verified before construction of the French Drain begins. This verification program will consist of drilling the drain alignment on 100-foot centers. This boring program will be extended to include SWMU 119.2 to confirm the absence of a saturated colluvial zone. If saturated colluvial material is encountered, the French Drain will be extended to collect groundwater from the SWMU 119.2 area. All borehole locations will be adjacent to the broken line indicating the French Drain on Figure 5-1.

5.1 Influent/Effluent Line Drilling

The influent/effluent line drilling objectives are to determine:

- Bedrock lithologies including identification of sandstone units
- Depth to bedrock

- Appropriate level of protection for site personnel
- Appropriate disposition of excavated soils
- Geotechnical characteristics of area soils
- Compliance with criteria under the CAA for ambient air monitoring

The following approach and key assumptions will be followed for the influent/effluent area. (The SOPs for field operations referenced in Section 5.0 will be used for all project work where applicable.)

- All boreholes will be augured and cored in Level D or as described in the H&S Plan and SOPs. Decontamination will be in accordance with the H&S Plan and SOPs shown in Figure 5-1.

- Geotechnical samples of all influent/effluent boreholes (24 total) will be obtained in general accordance with Standard Penetration Test procedures (ASTM D-1586), generally at 5 foot intervals. Sample will include both modified California barrel (2-inch I.D., 2 1/2-inch O.D.) and split spoon barrel (13/8 inch I.D., 2 inch O.D.) samples. Holes will be completed utilizing a hollow stem auger from ground surface to top of bedrock (assuming 25 foot depth to bedrock).

- One influent/effluent pipeline borehole will be drilled, sampled, equipment decontaminated and abandoned per day.

- Hollow stem auger rigs with good traction will be used.

- Blow counts will be recorded when available and lithology logs will be made.

- No geochemical analyses or packer tests will be taken from the borings.

- The alignment of the influent/effluent line is very near SWMUs, therefore all cuttings will be contained in 55-gallon drums. Continuous core augering will be conducted for all boreholes along the alignment. In order to characterize the soils for excavation purposes a composite sample will be collected over the first ten feet. This sample will be analyzed for all chemical parameters consistent with soil analysis along the French Drain alignment except volatiles. Discrete volatile samples will be collected in 3-inch-long liners from depths of 2 and 6 feet.

- Real-time monitoring for organic vapors and radioactivity will be conducted by field personnel as referenced in the project Health and Safety Plan.

- Continuous, radioactive ambient air, and meteorological monitoring will be conducted by air programs personnel.

- An estimated 125 geotechnical samples will be taken. The samples obtained during the field investigation will be inspected and classified in accordance with the draft Borehole Logging SOP. To aid in classifying the soil and bedrock and to determine general soil characteristics, selected laboratory tests (moisture content, unit weight, Atterberg limits, grain size distribution, swell-consolidation, unconfined compression test, etc.) will be performed on representative samples. Additionally, approximately 4 to 5 consolidated undrained triaxial shear or direct shear tests will be conducted on selected samples.

- Borehole will be abandoned by grouting the hole with a cement bentonite slurry. This will be done using the tremie pipe method for all boreholes as soon as possible after hydraulic tests are completed in accordance with applicable requirements.

- Influent/effluent line borings will be conducted following completion of French Drain area borings.

- EG&G will provide analytical services, blue ice and coolers for sample shipment, and shipping of coolers back to sampling crews.

- EG&G will provide radiation monitoring of drilling locations, sample containers and coolers, prior to shipment.

- EG&G will provide drums for decontamination fluids, soils, and drilling fluids.

- EG&G will provide excavation and work permits, and utility checks for drilling locations.

- Facilities presently staged (phone, trailer) will be available over the course of this project.

- Two drilling rigs will be used to conduct the influent/effluent area drilling. The rigs will start at opposite ends of the area and every other hole will be augered to bedrock. After this first pass, locations for geotechnical samples will be selected and they will be obtained on the second pass.

- Twenty-four (24) rig days (1 day/hole) will be required for the influent/effluent area drilling.

5.2 French Drain Area

The French Drain area objectives are to determine the following:

- Bedrock lithology including identification of sandstone units
- Depth to bedrock
- Appropriate level of protection for construction
- Appropriate disposition of excavated soils
- Geotechnical characteristics of area soils
- Hydraulic conductivities of each five foot depth interval in bedrock
- Specific hydraulic conductivity of each encountered bedrock sandstone unit NOTE: Hydraulic variations within the same sandstone units are expected, however they should not exceed 3 orders of magnitude. If variations in hydraulic conductivities varies greater than three orders of magnitude, major modifications in the drain design will be needed. The quantification of these intervals is not within the scope of the IRA geotechnical drilling. Detailed analysis of these intervals will then be performed in future remedial investigations.
- Appropriateness of proposed French Drain location
- Chemical characteristics of soils along the alignment
- Compliance with criteria under the CAA for ambient air monitoring.

The following approach and key assumptions will be followed for the French Drain area:

- All boreholes will be augered and cored in Level D in accordance with procedures outlined in the H&S Plan. Equipment decontamination will be conducted in accordance with the procedures outlined in Table 5-1.
- French drain collection system boreholes (26 total) will be continuously sampled with a hollowstem auger rig from ground surface to top of bedrock, and then continuously cored 18 feet into the top of bedrock (assuming depth to bedrock is 25 feet). An additional six holes may be augered to bedrock in order to obtain geotechnical samples.

- Each French Drain collection system borehole will require two days for drilling, sampling, testing where appropriate, and abandonment.

- All French Drain and extension boreholes will be continuously sampled. Discrete soil samples for VOC analysis will be taken every two feet. Composite samples for metals, semivolatiles, inorganics, pesticide/PCBs, and radionuclides will be taken every four feet and will require a minimum of two foot of core to complete the analytical suite listed in Table 1.

- EG&G will provide analytical services. The laboratory will provide blue ice and coolers for sample shipment, and will pay for shipping coolers back to the sampling crews.

- Selected geotechnical samples of French Drain boreholes will be obtained from shelby tubes or in accordance with standard penetration test procedures (ASTM D-1586). Sample intervals will be selected following review of lithologic conditions. However, it is anticipated that 3 to 4 samples for approximately 10 borings will be acquired. The samples will be obtained from both soil and bedrock material.

- An estimated 40 geotechnical samples will be taken. The samples will be inspected and classified in accordance with the draft Borehole Logging SOP. To aid in classifying the soil and bedrock, selected laboratory tests will be performed. These tests include moisture content, unit weight, Atterberg limits, and grain size distribution. Additionally, to evaluate scope stability, consolidated-undrained triaxial shear test and/or direct shear tests will be conducted on an estimated 10 samples. Back pressure permeability tests will be performed on approximately 10 bedrock samples.

- EG&G will provide radiation monitoring of drilling locations and of sample bottles and coolers. In addition, EG&G will provide radiation screening for samples prior to sample shipment.

- EG&G will provide drums for decontamination fluids, soils, and drilling fluids.

- EG&G will provide excavation and work permits for drilling locations.

- Facilities presently staged (portable bathrooms, phone, and trailer) will be available over the course of this project.

- Two drilling rigs will be utilized to conduct the French Drain area drilling. The rigs will start at opposite ends of the alignment and will auger down to bedrock while continuously sampling in every other hole. Blow counts will be recorded when available and lithology logs will be made. Rigs will then be converted to enable downhole coring 18 feet into bedrock. Core will be wrapped in plastic and stored in well-labeled core boxes. A temporary casing will be installed in the alluvial material after bedrock has been encountered. The alluvial casings will be installed using a cement/bentonite slurry and 4-inch pvc pipe. All bedrock drilling will be performed through this alluvial casing using conventional water wash rotary techniques. Single packer tests will be performed every five feet as the hole is advanced. These alluvial casings are considered temporary since the boreholes will be grouted to the surface after completion of all hydraulic testing. However, since the bedrock/alluvial contact will be adequately sealed there is time constraint on borehole completion. Double packer tests were initially performed in an effort to save time and money. The double packer method did not work consistently because many of the boreholes collapsed after the drill pipe was removed. Single packer tests will be performed for the remaining boreholes as described in the Final Decision Document. Test intervals with this method progress in depth as boreholes are advanced. This method will limit the length of open hole and reduce the caving problems encountered with double packer tests. Discrete packer tests will also be conducted over the entire thickness of any sandstone units that are encountered. If the packer test unit is unable to keep up with the drilling rigs, one of the rigs will be converted to conduct packer tests.

- Fifty-two (52) rig days (2 days/hole) will be required for the French Drain area drilling.

- Single packer testing will be conducted on a pick-up mounted rig. Twenty-six (26) rig days will be required (one hole per day) to complete this task.

- The four borings located along the French Drain extension will be completed as two-inch piezometers.

- Continuous, radioactive ambient air, and meteorological monitoring will be conducted by air program personnel.

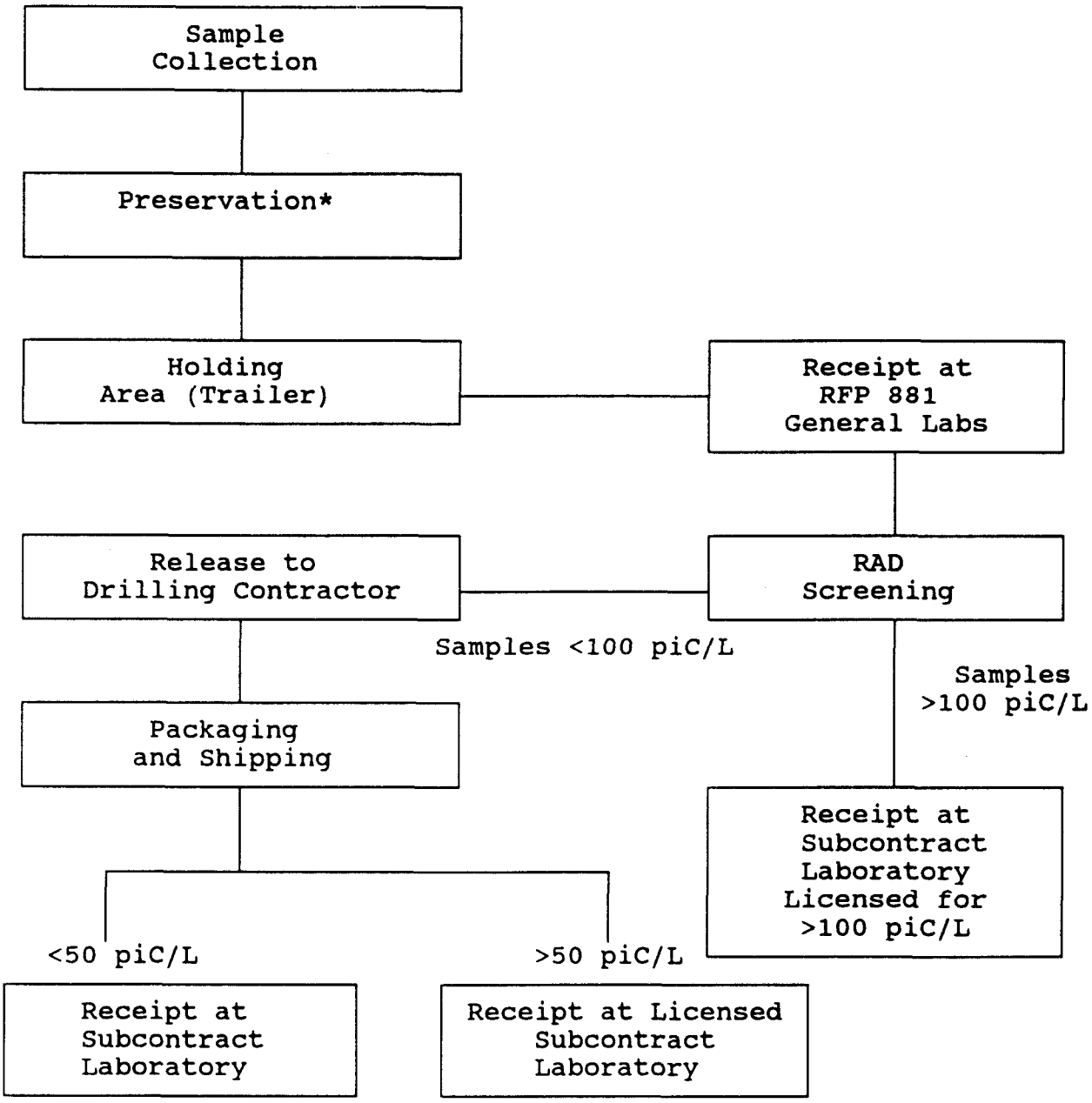
6.0 SAMPLE CHAIN-OF-CUSTODY AND SECURITY

A critical aspect of sound sample collection and analysis protocols is adherence to chain-of-custody (C-O-C) procedures. The purpose of these procedures is to preserve the representativeness of the samples during collection, transportation, and storage prior to analysis. C-O-C procedures include inventory and documentation during sample collection, shipment, and laboratory processing. A sample is considered to be in an individual's custody if the sample is: 1) in the physical possession or view of the responsible party, 2) secured to prevent tampering, or 3) placed in restricted area by the responsible party. The field samplers are responsible for sample custody and transfer of custody to the Drilling Contractor Project Manager. The Drilling Contractor Project Manager is responsible for training and oversight of field samplers in accordance with the chain of custody procedures. Additionally, the Drilling Contractor Project Manager is responsible for determining whether proper custody procedures were followed during field activities, and whether sufficient sample volume was collected for a specific analytical procedure.

The C-O-C for sample flow from field collection to receipt at the laboratory is illustrated in Figure 6-1.

Sample custody procedures, including C-O-C, for this project will be in strict conformance to established EG&G C-O-C procedures for field and laboratory activities. Field sample security and C-O-C procedures are described in Standard Operating Procedures, Environmental Restoration Program, Rocky Flats Plant (1/89), Section 1.3. Laboratory sample security and chain-of-custody procedures are described in Exhibit III, *Specifications for Chain-of-Custody, Documentation Procedures, and Written Standard Operating Procedures*, of RFP-SOW General Radiochemistry and Routine Analytical Services Protocol (2/90).

Figure 6-1 Project Chain-of-Custody Sample Flow



*NOTE: Preservation of soil samples is limited to cooling by storing the samples in a chilled environment. All samples collected are immediately placed in an iced cooler.

7.0 ANALYTICAL OPERATIONS PLAN

All samples collected during this study will be analyzed by laboratories under contract to EG&G RFP. All laboratories performing work will produce data consistent and comparable with EPA-CLP requirements. Soil samples will be analyzed for volatile organic, semivolatile organics, pesticides/PCB, metals, non-TAL metals, water quality parameters, radiochemical parameters, and air quality parameters. Detailed method references and analytical requirements are described in General Radiochemistry and Routine Analytical Services Protocol (GRRASP, 2/90).

7.1 Method References

All samples taken will be analyzed using the methods illustrated in Table 7-1.

Table 7-1

Sample Analysis Methods

Analyte	Method
Volatile Organics	USEPA-CLP SOW for Organics Analysis, 2/88
Semivolatile Organics	USEPA-CLP SOW for Organics Analysis, 2/88
Pesticides/PCB	USEPA-CLP SOW for Organics Analysis, 2/88
Metals	USEPA-CLP SOW for Inorganics Analysis, 7/87
Non-TAL Metals	USEPA-CLP SOW for Inorganics Analysis, 7/87
Water Quality Parameters	AWWI Standard Methods, EPA Methods
Radiochemistry	EPA Procedures for Radiochemical Analysis, NRC Regulatory Guides, RFP-SOW (GRRASP)

Analysis of parameters others than those listed must be approved as to adequacy of methods and detection limits by the Project Manager and the QAO. All laboratories analyzing project samples must strictly adhere to the methods cited and their internal laboratory SOPs for sample receipt, storage, handling, preparation, analysis, tracking, data verification, data reduction, and reporting.

7.2 Detection Limits

Detection limits for all analytical parameters are based upon applicable state and federal standards and are presented in Tables 7-2 through 7-8. Detection limits for any additional analyses needed are specified in RFP-SOW General Radiochemistry and Routine Analytical Services Protocol (GRRASP, 2/90).

Table 7-2

CLP Target Compound List (TCL)
of Volatile Organics

Volatiles	CAS Number	Quantitation Limits Water ug/L	Low Soil/ Sediment ug/Kg
1. Chloromethane	74-87-3	10	10
2. Bromomethane	74-83-9	10	10
3. Vinyl Chloride	75-01-4	10	10
4. Chloroethane	75-00-3	10	10
5. Methylene Chloride	75-09-2	5	5
6. Acetone	67-64-1	10	10
7. Carbon Disulfide	75-15-0	5	5
8. 1,1-Dichloroethene	75-35-4	5	5
9. 1,1-Dichloroethane	75-34-3	5	5
10. 1,2-Dichloroethene (Total)	540-59-0	5	5
11. Chloroform	67-66-3	5	5
12. 1,2-Dichloroethane	107-06-2	5	5
13. 2-Butanone	78-93-3	10	10
14. 1,1,1-Trichloroethane	71-55-6	5	5
15. Carbon Tetrachloride	56-23-5	5	5
16. Vinyl Acetate	108-05-4	10	10
17. Bromodichloromethane	75-27-4	5	5
18. 1,2-Dichloropropane	78-87-5	5	5
19. cis-1,3-Dichloropropene	10061-01-5	5	5
20. Trichloroethene	79-01-6	5	5
21. Dibromochloromethane	124-48-1	5	5
22. 1,1,2-Trichloroethane	79-00-5	5	5
23. Benzene	71-43-2	5	5
24. trans-1,3-Dichloropropene	10061-02-6	5	5
25. Bromoform	75-25-2	5	5
26. 4-Methyl-2-pentanone	108-10-1	10	10
27. 2-Hexanone	591-78-6	10	10
28. Tetrachloroethene	127-18-4	5	5
29. Toluene	108-88-3	5	5
30. 1,1,2,2-Tetrachloroethane	79-34-5	5	5
31. Chlorobenzene	108-90-7	5	5
32. Ethyl Benzene	100-41-4	5	5
33. Styrene	100-42-5	5	5

Table 7-3

CLP Target Compound List (TCL)
of Semi-Volatile Organics

Volatiles	CAS Number	Quantitation Limits Water ug/L	Low Soil/ Sediment ug/Kg
34. Xylenes (Total)	1330-20-7	5	5
35. Phenol	108-95-2	10	330
36. bis(2-Chloroethyl)ether	111-44-4	10	330
37. 2-Chlorophenol	95-57-8	10	330
38. 1,3-Dichlorobenzene	541-73-1	10	330
39. 1,4-Dichlorobenzene	106-46-7	10	330
40. Benzyl alcohol	100-51-6	10	330
41. 1,2-Dichlorobenzene	95-50-1	10	330
42. 2-Methylphenol	95-48-7	10	330
43. bis(2-Chloroisopropyl)ether	108-60-1	10	330
44. 4-Methylphenol	106-44-5	10	330
45. N-Nitroso-di-n-dipropylamine	621-64-7	10	330
46. Hexachloroethane	67-72-1	10	330
47. Nitrobenzene	98-95-3	10	330
48. Isophorone	78-59-1	10	330
49. 2-Nitrophenol	88-75-5	10	330
50. 2,4-Dimethylphenol	105-67-9	10	330
51. Benzoic acid	65-85-0	50	1600
52. bis(2-Chloroethoxy)methane	111-91-1	10	330
53. 2,4-Dichlorophenol	120-83-2	10	330
54. 1,2,4-Trichlorobenzene	120-82-1	10	330
55. Naphthalene	91-20-3	10	330
56. 4-Chloroaniline	106-47-3	10	330
57. Hexachlorobutadiene	87-68-3	10	330
58. 4-Chloro-3-methylphenol (para-chloro-meta-cresol)	59-50-7	10	330
59. 2-Methylnaphthalene	91-57-6	10	330
60. Hexachlorocyclopentadiene	77-47-4	10	330
61. 2,4,6-Trichlorophenol	88-06-2	10	330
62. 2,4,5-Trichlorophenol	95-95-4	50	1600
63. 2-Chloronaphthalene	91-58-7	10	330
64. 2-Nitroaniline	88-74-4	50	1600

Table 7-3 (continued)

CLP Target Compound List (TCL)
of Semi-Volatile Organics

	Volatiles	CAS Number	Quantitation Limits Water ug/L	Low Soil/ Sediment ug/Kg
65.	Dimethylphthalate	131-11-3	10	330
66.	Acenaphthylene	208-96-8	10	330
67.	2,6-Dinitrotoluene	606-20-2	10	330
68.	3-Nitroaniline	99-09-2	50	1600
69.	Acenaphthene	83-32-9	10	330
70.	2,4-Dinitrophenol	51-28-5	50	1600
71.	4-Nitrophenol	100-02-7	50	1600
72.	Dibenzofuran	132-64-9	10	330
73.	2,4-Dinitrotoluene	121-14-2	10	330
74.	Diethylphthalate	84-66-2	10	330
75.	4-Chlorophenyl-phenyl ether	7005-72-3	10	330
76.	Fluorene	86-73-7	10	330
77.	4-Nitroaniline	100-01-6	50	1600
78.	4,6-Dinitro-2-methylphenol	534-52-1	50	1600
79.	N-nitrosodiphenylamine	86-30-6	10	330
80.	4-Bromophenyl-phenylether	101-55-3	10	330
81.	Hexachlorobenzene	118-74-1	10	330
82.	Pentachlorophenol	87-86-5	50	1600
83.	Phenanthrene	85-01-8	10	330
84.	Anthracene	120-12-7	10	330
85.	Di-n-butylphthalate	84-74-2	10	330
86.	Fluoranthene	206-44-0	10	330
87.	Pyrene	129-00-0	10	330
88.	Butylbenzylphthalate	85-68-7	10	330
89.	3,3'-Dichlorobenzidine	91-94-1	20	660
90.	Benzo(a)anthracene	56-55-3	10	330
91.	Chrysene	218-01-9	10	330
92.	bis(2-Ethylhexyl)phthalate	117-81-7	10	330
93.	Di-n-octylphthalate	117-84-0	10	330
94.	Benzo(b)fluoranthene	205-99-2	10	330
95.	Benzo(k)fluoranthene	207-08-9	10	330
96.	Benzo(a)pyrene	50-32-8	10	330
97.	Indeno(1,2,3-cd)pyrene	193-39-5	10	330
98.	Dibenz(a,h)anthracene	53-70-3	10	330
99.	Benzo(g,h,i)perylene	191-24-2	10	330

Table 7-4

CLP Target Compound List (TCL)
for Pesticides/PCBs

Pesticides/PCBs		CAS Number	Quantitation Limits*** Water ug/L	Low Soil/ Sediment**** ug/Kg
100.	alpha-BHC	319-84-6	0.05	8.0
101.	beta-BHC	319-85-7	0.05	8.0
102.	delta-BHC	319-86-8	0.05	8.0
103.	gamma-BHC (Lindane)	58-89-9	0.05	8.0
104.	Heptachlor	76-44-8	0.05	8.0
105.	Aldrin	309-00-2	0.05	8.0
106.	Heptachlor epoxide	1024-57-3	0.05	8.0
107.	Endosulfan I	959-98-8	0.05	8.0
108.	Dieldrin	60-57-1	0.10	16.0
109.	4,4'-DDE	72-55-9	0.10	16.0
110.	Endrin	72-20-8	0.10	16.0
111.	Endosulfan II	33213-65-9	0.10	16.0
112.	4,4'-DDD	72-54-8	0.10	16.0
113.	Endosulfan sulfate	1031-07-8	0.10	16.0
114.	4,4'-DDT	50-29-3	0.10	16.0
115.	Methoxychlor	72-43-5	0.5	80.0
116.	Endrin ketone	53494-70-5	0.10	16.0
117.	alpha-Chlordane	5103-71-9	0.5	80.0
118.	gamma-Chlordane	5103-74-2	0.5	80.0
119.	Toxaphene	8001-35-2	1.0	160.0
120.	Aroclor-1016	12674-11-2	0.5	80.0
121.	Aroclor-1221	11104-28-2	0.5	80.0
122.	Aroclor-1232	11141-16-5	0.5	80.0
123.	Aroclor-1242	53469-21-9	0.5	80.0
124.	Aroclor-1248	12672-29-6	0.5	80.0

***Quantitation limits listed for soil/sediment are based on wet weight. The quantitation limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

****Medium Soil/Sediment Contract Required Quantitation Limits (CRQL) for Pesticide/PCB TCL compounds are 15 times the individual Low Soil/Sediment CRQL.

Table 7-4 (continued)

CLP Target Compound List (TCL)
for Pesticides/PCBs

Pesticides/PCBs	CAS Number	Quantitation Limits Water ug/L	Quantitation Limits Low Soil/ Sediment ug/Kg
125. Aroclor-1254	11097-69-1	1.0	160.0
126. Aroclor-1260	11096-82-5	1.0	160.0

Note: Specific quantitation limits are highly matrix dependent. The quantitation limits listed herein are provided for guidance and may not always be achievable.

Table 7-5

CLP Target Analyte List (TAL)
for Metals

Element	Nominal Detection Limit Water (ug/L)	Soil (mg/kg)
Aluminum	200	40
Antimony	60	12
Arsenic	10	2
Barium	200	40
Beryllium	5	1.0
Cadmium	5	1.0
Calcium	5000	2000
Chromium	10	2.0
Cobalt	50	10
Copper	25	5.0
Cyanide	10	10
Iron	100	20
Lead	5	1.0
Magnesium	5000	2000
Manganese	15	3.0
Mercury	0.2	0.2
Nickel	40	8.0
Potassium	5000	2000
Selenium	5	1.0
Silver	10	2.0
Sodium	5000	2000
Thallium	10	2.0
Vanadium	50	10.0
Zinc	20	4.0

Table 7-6

Non-CLP Target Analyte List

Analyte	Required Detection Limits Water (ug/L)	Soil (mg/kg)
Cesium	1000	200
Chromium (VI)	10	1
Lithium	100	20
Molybdenum	200	40
Strontium	200	40
Tin	200	40

Table 7-7

Water Quality Parameter List (WQPL)

Parameter	Required Detection Limits (mg/L)	Method Ref.
Chloride	5	325.2
Nitrate as N	5	353.2
Sulfate	5	375.4
Fluoride	5	340.2
Bicarbonate	10	310.1
Carbonate	10	310.1
Total Dissolved Solids	5	160.1
Total Suspended Solids	10	160.2
Dissolved Oxygen	0.5	S.M.413
Oil and Grease	5	413.2
pH	0.1 pH Unit	150.1
Specific Conductivity	1	120.1
Sulfide (soil/sediment only)	4 (ug/g)	376.1

Table 7-8

Radiochemical Parameters

Parameter	Required Detection Limit (MDA) Water (pCi/L)	Soil (pCi/g)	Air (pCi/g)
Gross Alpha	2	4 (dry)	
Gross Beta	4	10 (dry)	
Tritium	400	400 (pCi/ml)	
$Pu^{239,240}$	0.01	0.03 (dry)	*4×10^{-6}
$U^{233,234}$	0.6	0.3 (dry)	
U^{235}	0.6	0.3 (dry)	
U^{238}	0.6	0.3 (dry)	
$Americium^{241}$	0.01	0.02 (dry)	*9×10^{-6}
$Strontium^{89+90}$	1	1 (dry)	
$Cesium^{137}$	1	0.1 (dry)	
$Radium^{226}$	0.5	0.5 (dry)	
$Radium^{228}$	1	0.5 (dry)	
$Curium^{244}$	1	0.5 (dry)	
$Neptunium^{237}$	1	0.5 (dry)	
$Thorium^{230+232}$	1	0.5 (dry)	

* 30,000 m^3 samples +10% recovery

7.3 Instrumentation Required

The instrumentation required to conduct analyses is specified in the cited methods. Any deviations from prescribed instrumentation and operating conditions must be approved by the Project Manager, the QAO, and EG&G Purchasing prior to commencing work.

7.4 Sample Holding Times

All samples will be analyzed within timeframes established in the appropriate methods. Holding times for all parameters are illustrated in Table 7-9. All analytical holding times for this project are specified in 40 CFR 136. The holding times specified in Table 7-9 and 40 CFR 136 are for water samples. These holding times will be used as advisory guidance for soil sampling and analysis. Specific holding times for filtered/unfiltered and preserved/unpreserved samples will be in accordance with 40 CFR 136.

Table 7-9

Sample Holding Times

Analysis	Holding Time (from Collection Date)
Volatile Organics	7 days
Semivolatile Organics	7 days (extraction) 40 days (analysis)
Pesticides/PCB	7 days (extraction) 40 days (analysis)
Metals	180 days 28 days (Mercury) 14 days (Cyanide)
Water Quality Parameters	180 days 7 days (TSS) 7 days (TDS) 14 days (Alkalinity)
Radiochemistry	180 days (water only)
Radioactive Ambient Air	Unlimited
Meteorological	Unlimited
Soil Radionuclides	Unlimited

7.5 Sample Tracking and Record Keeping

Adequate sample tracking and record keeping procedures will be in place to ensure that sample identities will be maintained

and all sample related activities will be documented. Procedures and formats that will be used are, Requirements for Sample Analysis, Deliverables, and Documentation Supplied by Analytical Laboratory Contractors, RFP-SOW General Radiochemistry and Routine Analytical Services Protocol (GRRASP, 2/90).

8.0 CALIBRATION PROCEDURES AND FREQUENCY

Calibration of equipment used to perform geotechnical testing will be in accordance with those procedures specified in the ASTM Method D 422-63 for hydrometer and sieve analyses (Annual Book of ASTM Standards, Volume 04.08, 1984). The equipment calibrations, including those for ovens, thermometers and balances, shall be done at a minimum of every six months and prior to large-scale testing.

Calibrations of field instruments during sampling will be logged in the field notebook or field data sheets. Laboratory calibration of field instruments will be performed at a minimum of every six months and logged in the equipment maintenance logbook. In general, calibration procedures will follow the instructions given by the manufacturer. The instrument's manual will be available to the operator.

Calibration of laboratory equipment will be performed according to the specified analytical methods and specific calibration requirements given in RFP-SOW GRRASP.

Calibration of air sampling equipment is performed by EG&G calibration laboratory in accordance with manufacturer's specifications. Calibrations on the sampling equipment are performed and recorded every six months and additionally after any maintenance. These procedures are written as SOPs executed by the calibration laboratory.

Calibration of meteorological equipment is performed by a contractor in accordance with EG&G QA/QC procedures.

9.0 DATA REDUCTION, VALIDATION, AND REPORTING

Analytical laboratories will provide results to the EG&G RFP ER Division Manager, the Subcontractor Project Manager, and EG&G ER Department QAOs. These data will include results for laboratory blanks and duplicates, matrix spikes, and calibration check standards as required by specified analytical methods. Analytical results will be independently validated and validated results will be reported to the ER Division Manager and the QAO.

9.1 Data Reduction

Data reduction functions are divided into field and laboratory reduction activities. Each of these activities are summarized below.

9.1.1 *Field Data Reduction*

All field measurements and observations will be recorded in project log books, on field data forms, or on similar permanent records. Field measurements as specified in field procedure 5.0 will be entered into the field logs. All data will be recorded directly and legibly in field logbooks or on field forms with all entries signed and dated. If entries must be changed, the change will not obscure the original entry. The reason for the change will be stated and the correction and explanation will be signed and dated or otherwise appropriately identified at the time the correction is made. Field data records will be organized into standard formats whenever possible and retained in permanent files.

Field operations and sampling records include:

- Field data sheets, field logs
- Data processing and storage records
- Sample identification and C-O-C records
- Document control, inventory, and filing records
- Quality assurance/quality control records
- Health and safety records
- Financial and project tracking records.

The combined data records will be sufficiently detailed to provide a complete and accurate history of data gathering and results.

9.1.2 *Laboratory Data Reduction*

Laboratory data will be recorded or acquired during analysis and then prepared for review through computerized or manual algorithms to produce a raw data set. Raw data will be verified

through checking calculations, dilutions, and standard QC sample concentrations and comparing these to known or expected values. Laboratories will review all raw data in this manner prior to preparing results for release. A second verification of laboratory data reduction will occur during data validation. Any errors or discrepancies discovered during reduction will be corrected prior to generating final reports. Corrections to raw data and documentation will be initialized and dated after making the changes.

9.2 Validation

Validation activities consist of reviewing and verifying field and laboratory data and evaluating data quality. The description of both these activities is described below.

Data validation includes the analytes listed in Section 4.3.2 through 4.3.7.

9.2.1 *Field Data Validation*

Validation of field technical data will be performed on two different levels. First, all data will be validated at the time of collection by following Section 5.0 of the Standard Operating Procedures Environmental Restoration Program Rocky Flats Plant (1/89) and the QC checks specified in Appendix A. Secondly, data will be validated by the Drilling Project Supervisor who will review all collected data to ensure the correct codes and units have been used. After data reduction into tables or arrays, the Drilling Project Supervisor will review data sets for anomalous values. Any inconsistencies discovered should be annotated by data collection personnel in the field log book at the time the data is collected, to explain any anomalous values.

Managerial data will be validated by the Project Manager for reasonableness and completeness. Random checks of sampling and field conditions will be made by the Drilling Project Supervisor who will check recorded data at the time to confirm observations. Whenever possible, peer review will also be incorporated into the data validation process in order to maximize consistency among field personnel.

9.2.2 *Laboratory Data Validation*

The QAOs will review results of QC acceptance evaluations and will document acceptance or non-acceptance of data. The QAOs will maintain records of QC acceptance tests. These records will be subject to independent audit, which may include Los Alamos National Laboratory.

Data will be reviewed and validated by EG&G ER Department subcontractor QA staff. Results of data review and validation activities are documented in data validation reports. U.S. EPA-CLP data validation functional guidelines are used for validating organic and inorganic (metals) data. Functional guidelines for validating radiochemistry and water quality parameter data have not been published by EPA; however, data validation functional guidelines have been established by the EG&G ER Department. The functional guidelines which will be used to evaluate analytical data are the following:

- USEPA, Laboratory Data Validation Functional Guidelines for Evaluating Organics Data, (2/88).
- USEPA, Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Data, (7/88).
- EG&G Rocky Flats, Water Quality Parameter Data Validation Guidelines (9/89, Rev. 3/90).
- EG&G Rocky Flats, Radiochemical Data Validation Guidelines - Tritium Analyses by Liquid Scintillation, (9/89, Rev. 5/90).
- EG&G Rocky Flats, Radiochemical Data Validation Guidelines - Isotopic Analyses by Alpha Spectrometry, (9/89, Rev. 5/90).
- EG&G Rocky Flats, Radiochemical Data Validation Guidelines - Gross Alpha/Beta by Gas Proportional Counters, (9/89, Rev. 5/90).

Analytical data generated for ER Program activities are assigned data usability qualifiers. Data usability qualifiers are assigned as a result of the data validation process and are consistent with EPA data usability qualifiers. The data usability qualifiers in use are:

V Valid (usable for all purposes).
A Acceptable with Qualifications (usable for most purposes).
R Rejected (unusable for most purposes).

All data generated in conjunction with this project are subject to 100 percent verification and validation.

9.3 Reporting

Results of data validation are reported in ER Department Data Assessment Summary reports. Report formats and Data Summary Table

formats are presented in Appendix I, Data Reporting Formats. Sample analysis reporting turnaround times are presented in Table 9-1. The reporting frequencies have been established for ER Department routine analyses. For this project, reporting times for some analyses may be accelerated.

Table 9-1

Analytical Reporting Turnaround Times
(Calendar Days)

Analysis	Sample Data Pkg.	Supporting Documentation Pkg.
All except Radiochemistry	45 days	50 days
Radiochemistry	61 days	66 days

All data validation reports must be completed within 30 days of receiving a complete, validatable data package.

10.0 INTERNAL QUALITY CONTROL CHECKS

Standard quality control procedures are employed to provide accurate, precise, consistent, and comparable results. QC procedures consist of field QC samples and laboratory QC samples.

10.1 Field Sampling Quality Control Procedures

The field duplicate, the trip blanks, and the equipment rinsate will be sent from the field with the samples to the analytical laboratories. Table 10-1 shows the collection frequency of each of these QC samples. Procedures which describe duplicate, trip blank, and equipment rinsate blank preparation for field sampling quality control are described in Section 5.0 of Standard Operating Procedures, Environmental Restoration Program, Rocky Flats Plant (1/89).

Table 10-1

QC Sample Collection Frequency

Activity	Frequency
Field Duplicate	1 in 20
Trip Blank	1 per shipping container
Equipment Rinsate Blank	1 in 20

The field replicates and blanks will be used to provide measures of the internal consistency of the sampling procedures and storage practices. The total number of QC samples that will be collected will represent at a minimum one for every batch of 20 field samples. This proportion of QC samples will identify most potential sources of error.

10.1.1 *Field Duplicate*

Field duplicates are used to provide a measure of variations associated with the sample collection procedure, variations within a sample, and variability between the analytical laboratories. A field duplicate is obtained when a sample from one location is split into two equal portions, with each portion going to the laboratory. Volatile samples are collected using a 3 inch stainless steel liner secured directly behind the shoe of a modified California split barrel sampler. The liner is immediately

covered with teflon sheet, capped and taped to minimize the loss of volatiles. Duplicate samples are collected by using a similar barrel which has been adapted so two stainless 3-inch stainless steel liners can be secured directly behind the shoe. A field duplicate will be taken for every 20 regular samples collected. The field duplicate will always be collected using procedures identical to those used to collect a regular sample except that twice as much sample will be collected.

10.1.2 *Equipment Rinsate Blank*

Equipment blanks (i.e., bailer washes) will be prepared for manual and small automated sampling equipment used to collect groundwater samples. Equipment blanks will be collected once per 20 samples collected by pouring volatile-free ASTM Type II reagent water into/through/over a clean piece of sampling equipment, such as bailers, and then dispensing it into prepared sample bottles. These sample bottles will be randomly selected from the supply of prepared sample bottles, selecting a sample container appropriate for each type of analysis for which environmental samples are being collected. Analyses of equipment rinsates are used to assess the efficiency of equipment decontamination procedures in preventing cross-contamination between samples.

10.1.3 *Trip Blanks*

Trip blanks will be prepared at the beginning of the sampling trip by pouring volatile-free ASTM Type II reagent water into prepared sample bottles. These sample bottles will be randomly selected from the supply of prepared sample bottles. Sample containers will be filled to yield an appropriate sample volume for each type of VOC analysis, resulting in a complete trip blank for the sampling event. These trip blanks will be prepared at the laboratory, shipped to the site, stored with the unused sample bottles, transported to the sampling site, and then shipped for analysis with the samples collected during the sampling event. The trip blanks will remain unopened throughout the sampling event. Analysis of trip blanks is used to assess contamination of sample containers during storage at the site and contamination of samples during transport to the laboratory. One trip blank will be included in each shipping container containing samples for VOC analysis.

Trip blanks will not be used during the shipment of soil samples. Unlike water, commercially available blank soils which adequately reflect the various soil types encountered within each borehole are not available. Development of blank soil types within the RFP region is not practical due to the subjectivity of background soil conditions.

10.2 Laboratory Quality Control Procedures

Laboratory QC procedures are used to provide measures of internal consistency of analytical and storage procedures. Specific QC procedures and QC criteria are in place for organic, inorganic, water quality parameter, and radiochemical analyses. The laboratory QC procedures used are described in detail in the analytical methods cited and in RFP-SOW GRRASP. All laboratory QC procedures are consistent with EPA-CLP QC procedures.

11.0 PREVENTIVE MAINTENANCE

Preventive maintenance procedures for analytical and field equipment will be instituted to prevent the use of data collected with improperly operating instrumentation.

The operational status of field equipment will be checked prior to initiation of field operations and on a weekly basis during the period of use for the equipment. All malfunctioning equipment will be repaired or replaced before use. The Subcontractor Site Manager will be responsible for implementing and documenting field equipment preventive maintenance procedures.

Subcontract laboratories analyzing ER Department samples for this project will perform preventive maintenance on analytical equipment according to their internal SOPs, instrumentation/ equipment service agreements, or as specified by the manufacturer.

12.0 SYSTEM AND PERFORMANCE AUDITS

Field operations and laboratory analysis activities related to this project are subject to System and Performance Audits. A System Audit is an evaluation of the entire project QA Program and Operations. A Performance Audit is equivalent to a "surveillance" and consists of evaluating the implementation and effectiveness of a particular procedure, item, or operation. Audits may be performed to ensure that field and laboratory procedural mechanisms are operative, conform to project requirements, and effective as implemented. Audits may be conducted by EG&G and/or subcontractor QA staff.

The type and frequency of System and Performance Audits conducted will be determined by the QAO. Written audit reports and notices of Corrective Action (if necessary) will be submitted to:

- EG&G RFP ER Division Manager
- Project Manager of Audited Organization
- Site Manager of Audited Organization
- QAO.

12.1 Field Operations Audits

At least one independent Performance Audit of field operations and/or sampling procedures will be conducted during the duration of the project. Additional audits of field activities may be scheduled at the discretion of the ER Division Manager, the 881 Hillside Project Manager, or the QAO. Additional Performance Audits may be needed to verify that Corrective Action items have been addressed and corrective action taken had been effectively implemented. Written audit reports prepared for all audits of field activities.

The conduct of System and Performance Audits of field operations and/or sampling is guided by written audit procedures and checklists. An example of such a procedure and checklist is found in Procedures and Guidelines for Conducting Internal Sampling Audits, Rocky Flats Plant (12/88, Rev. 3/89).

12.2 Laboratory Audits

At least one independent System Audit is performed by EG&G, or its designees, on an annual basis for each laboratory analyzing ER Department samples. The audit verifies that a system of quality controls, procedural mechanisms, qualified personnel, and requisite instrumentation/equipment are operational and have been effectively implemented for analysis of EG&G samples.

Prior to award of a contract to a laboratory subcontractor, a Pre-award System Audit is conducted at the prospective subcontractor's facility to determine that the laboratory has the requisite qualified personnel, required facilities and equipment, and procedural mechanisms in place to satisfy the RFP-SOW. Additional follow-up audits may be scheduled at the discretion of the ER Division Manager, the 881 Hillside Project Manager, or the QAO. Performance Audits may also be requested to verify that a Corrective Action request item had been resolved or that corrective action taken was effectively implemented.

Written reports will be prepared for all laboratory audits conducted. Conduct of laboratory audits is guided by written procedures and checklists such as those found in or developed from the following documents:

- EG&G Rocky Flats, Procedures for Conducting Organic Laboratory Audits, (12/88, Rev. 1/89).
- EG&G Rocky Flats, Procedures for Conducting Inorganic Laboratory Audits,(12/88, Rev. 1/89).
- EG&G Rocky Flats, Procedures for Conducting Radiochemistry Laboratory Audits, (5/90).
- ASTM D-422 Particle-Size Analysis for Soils
- ASTM D-1586 Penetration Test and Split-Barrel Sumpling of Soils
- ASTM D-2166 Tests for Unconfined Compressive Strength of Cohesive Soils
- ASTM D-2487 Classification of Soils for Engineering Purposes
- ASTM D-2488 Description of Soils
- ASTM D-3080 Direct Shear Test of Soils
- ASTM D-2856 Triaxial UU
- ASTM D-2938 Unconfined Confined Compressive Strength of Intact Rock Core Specimens
- ASTM D-4318 Atterberg Limits
- ASTM D-2216 Laboratory Determination of Moisture Content
- ASTM D-854 Specific Gravity of Soils
- EPA 1900 Back Pressure Permeability
- ASTM D-2937 Density of Soil in Place

13.0 DATA ASSESSMENT

The EG&G Environmental Monitoring and Assessment Division (EMAD) is responsible for evaluating and validating analytical data from ER Department subcontract laboratories. The EMAD QA staff are assisted in this task by subcontractor QA staff who provide data review and validation support. In addition to validating data, the EMAD QA staff may assist the ER Division Manager and 881 Hillside Project Manager in determining data usability and acceptance.

13.1 Calculations

To ensure defensibility of the record, all calculations will be legible and in logical progression so that all steps and the reasoning behind the calculations can be understood. For calculations performed using a programmable calculator or computer, a sample calculation will be shown (written) in the project file together with a program listing and printout of input data. The calculated results also will be placed in the document control file. A calculation or series of calculations will contain the following, at a minimum:

- Task number, date performed, and signature of person who performed the calculation
- Basis for calculation (i.e., why is calculation being performed?)
- Assumptions made or inherent in calculation
- Reference (including page, where applicable) for each piece of input data (e.g., standard notebook, telephone memorandum, technical paper)
- Method used for calculations
- Results (underlined).

All calculations will be checked by an engineer or scientist of professional level equal to or higher than that of the originator. After completing the check, the reviewer will sign his or her name and the date immediately below that of the originator on the calculations. Both the originator and reviewer are responsible for the completeness and accuracy of the calculations and must initial any corrections.

13.2 Field Assessment

Field instruments will be calibrated in accordance with the requirements contained in Section 5.0 of the Standard Operating Procedures for ER Program Rocky Flats Plant to ensure accuracy of the measurements of field parameters. The Field Scientist or Engineer will be responsible for ensuring that all field instrumentation and equipment used at the site is functioning properly and has been calibrated in accordance with the procedures. Also, he will be responsible for recording all data accurately and legibly.

13.3 Laboratory Data Assessments

Data acceptance criteria and requirements are found in the EPA CLP-SOW, RFP-SOW (GRRASP), EPA data validation functional guidelines, and EG&G internal data validation functional guidelines.

Analytical data may be assessed in two ways: (1) Validity, and (2) Usability. Data validity and usability are closely related and may be assessed as:

V Valid; Usable for all purposes.
A Acceptable with Qualifications; Usable for most purposes.
R Rejected; Unusable for most purposes.

The quality, validity, and usability of environmental measurement data collected for this project will be determined by the Data Users prior to use.

DATA VALIDATION CRITERIA

The levels of data quality are determined by evaluating the quality of the data in terms of:

a. data quality objectives (precision, accuracy, representativeness, completeness, comparability)

b. intended use of the data (monitoring, decision-making, risk assessment, etc.)

c. specific program requirements (detection limits, analytical methods, types of analyses, QC)

Levels of Data Quality: 3 levels have been established for the ERP at RFP.

1. VALID

Data meets all 7 objective standards:

1. analytical methods followed
2. acceptance criteria achieved
3. sufficient number and type of QC samples analyzed
4. QC limits achieved
5. compounds and analytes correctly identified
6. equipment/instrumentation calibration criteria achieved
7. sample holding times met

2. ACCEPTABLE WITH QUALIFICATIONS

Data meets most, but not all, objective standards; primary validation criteria achieved (calibration, QC limits, method requirements, compounds and analytes correctly identified)

3. REJECTED

Data fails to meet objective standards; fails to meet primary validation criteria

Three levels of data usability are proposed for the ERP at the RFP:

1. USABLE FOR ALL PURPOSES:
   Data quality is classified valid.
   All data quality objectives achieved.
   All specific program requirements met.

2. USABLE FOR SOME PURPOSES:
   Data quality is classified valid or acceptable with qualifications (rejected data may be usable for some very limited purposes such as screening).
   Not all data quality objectives achieved.
   Not all specific program requirements met.

3. UNUSABLE
   Data quality is classified as rejected.
   Data quality objectives not achieved.
   Specific program requirements not met.

14.0 CORRECTIVE ACTION

Corrective action procedures will be instituted to correct any nonconformities with quality control procedures or objectives. Nonconforming items will be segregated or otherwise marked to indicate the status. Nonconformances in the Project Log or other forms or documents will be circled in red ink. Nonconformances shall be documented on a Nonconformance Report form, Figure 14-1. Nonconformances involving corrective actions will be dispositioned by completing a Corrective Action Report form, Figure 14-2. The necessity for corrective action can be identified through field and laboratory system or performance audits, data validation report action items, or by noting any deficiencies during the course of project activities. The essential steps in executing a corrective action are outlined below:

- Identify and define the problem.
- Assign responsibility for investigating the problem.
- Investigate and determine the cause of the problem.
- Determine corrective action to be taken to eliminate the problem.
- Assign responsibility for implementing the corrective action.
- Implement the corrective action and document what was done.
- Verify that the corrective action taken has effectively solved the problem.

Documentation of the problem is important to the overall management of the project. A Corrective Action Report form for problems associated with project activities, Figure 14-2, may be filled out by any project participant. This form identifies the problem, establishes possible causes, and designates the organization responsible for taking corrective action. The ER Division Manager, or his designee, is responsible for ensuring that Corrective Action Reports are developed for identified problems and that the reports are closed out.

The Corrective Action Report form includes a description of the corrective action planned and has space for follow-up comments. The ER Division Manager, or his designee, will verify that action taken appears effective and then verifies that the problem has been effectively resolved. The QAO will receive a copy of all Corrective Action Report forms and will enter them into a Corrective Action Log. This permanent record will aid the QAO in follow-up and will make any QA problems visible to the ER Division Manager and 881 Hillside Project Manager.

FIGURE 14-1

NONCONFORMANCE REPORT

EG&G ROCKY FLATS

NCR No. _____ DATE _____
QAL _____ PAGE _____ OF _____
AUTH # _____ BLDG. # _____
PROJ NCR No. _____ P.O. # _____

PROJECT: _____
RESPONSIBLE DEPARTMENT: _____
ITEM: _____ QUANTITY _____
SPECIFICATION REFERENCE: _____
NONCONFORMANCE DESCRIPTION: _____

ISSUED BY: _____ DATE _____
Name Title Organization

MANAGER, CONST. MGMT. & INSPECTION _____ DATE _____

PRELIMINARY DISTRIBUTION:
☐ BLDG. MGR. ☐ MANAGER FE. ☐ PROJ. ENGR. ☐ MANAGER MTCE. ☐ CM&I MASTER FILE ☐ SEISMIC QUAL.
☐ HS&E AREA ENGR. ☐ CONSTRUCTION COORDINATOR ☐ CONTRACTOR ☐ PUCHASING ☐ FIRE PROT. ENGR. ☐ OTHER

DISPOSITION: ☐ USE-AS-IS ☐ REPAIR ☐ REWORK ☐ REJECT ☐ AS-BUILT REQUIRED

DISPOSITION APPROVALS:

PROJECT ENG. _____ DATE _____ DESIGN CHECKER _____ DATE _____
HS&E AREA ENGR. _____ DATE _____ USER _____ DATE _____
PURCHASING (IF APPL.) _____ DATE _____ FIRE PROT. ENGR. _____ DATE _____
SEISMIC QUAL. _____ DATE _____ FOA _____ DATE _____

INTERIM DISTR.:
☐ MANAGER MTCE. ☐ PURCHASING ☐ PROJ. ADMIN. ☐ OTHER
☐ CONSTR. COORD. ☐ CM&I MASTER FILE ☐ CONTRACTOR ☐ APPROVERS

RF-46395 (Rev. 1/89) CMIC-21a

FIGURE 14-2

ER DEPARTMENT CORRECTIVE ACTION REPORT

	Type: Field ☐ Laboratory ☐	Corrective Action Report Number: _____ Audit Date: _____ Deviation (finding/ observation): _____

Organization: _____

Location: _____

Operation : _____

Requirement (procedure reference): _____

Deviation: _____

Quality Assurance Evaluator: _____ Date: _____

Response to Request for Corrective Action

Deviation Cause: _____

Corrective Action Taken: _____

Action Taken to Prevent Deviance Recurrence: _____

Date Corrective Action Completed: _____

Corrective Action Verification: _____

Signature of Evaluator: _____ Date: _____

Corrective Action Closed by (ER Program QA Officer): _____ Date: _____

15.0 QUALITY ASSURANCE RECORDS AND DOCUMENT CONTROL

Contractors will be required to package and submit records of their work activities to the ER Project Manager for review. The ER Project Manager will then forward the documents to the QA Records File. All documents from both contractors as well as EG&G describing work and quality activities for this project will be retained and controlled in the QA Records File. An additional copy of the records will be maintained at a separate location from the QA Records File. A records control function is in place to ensure that documents which demonstrate objective quality evidence are maintained and retrievable.

The documents which are retained in the QA Records file for this project include but are not limited to:

- QA Project Plans
- Field QA Surveillance
- Field, Laboratory, and Data Validation Procedures
- Field and Laboratory System and Performance Audit Reports
- Corrective Action Reports
- Data Validation Reports
- Correspondence Related to QA Activities
- Subcontractor QA Documents
- Health and Safety Documentation.

16.0 QUALITY ASSURANCE REPORTS

The EG&G ER Division Manager and the 881 Hillside Project Manager will rely on written reports documenting project progress and status, data assessment activities, system and performance audits, and corrective action reports, *ad hoc* QA Status summaries, and Technical Memoranda, to monitor overall adherence of the project to QA requirements. The reports will be maintained in the QA Records File to provide objective evidence of quality assurance activities. The QAO may generate some of these reports or direct QA subcontractors in preparing them.

The following reports will be maintained to support the EG&G 881 Hillside Project Manager in documenting QA activities:

- Project Progress Reports
- Field Operations Audits Reports
- Laboratory Audits Reports
- Corrective Action Reports
- QA Status Summaries
- Technical Memoranda
- All other Audit Reports.

Any other QA/QC reports or summaries identified by the ER Division Manager or the 881 Hillside Project Manager will be maintained in the QA Records File.

The QAO will review all QA reports prepared by subcontractor QA staff and will recommend to the ER Division Manager and the 881 Hillside Project Manager any QA actions that need to be taken. The QAO may also prepare Corrective Action Reports resulting from audits progress reports or documentation of any problems requiring corrective action.

17.0 QUALIFICATIONS OF PROJECT PERSONNEL

EG&G RFP and subcontractor key professional personnel performing project and QA functions will have the requisite background, education, training, experience, and expertise, (or appropriate combinations thereof) to execute their project and QA activities. Objective evidence of personnel qualifications is contained in personnel resumes maintained by EG&G RFP and their subcontractor organizations. A resume for each project participant should be on file with their respective organizations.

Any project activities requiring personnel with formal certification such as Inspectors and Lead Auditors will be performed using appropriately certified staff.

18.0 INDOCTRINATION AND TRAINING OF PROJECT PERSONNEL

All project personnel will be appropriately indoctrinated and trained in their areas of responsibility. With respect to QA activities and procedures, all key project personnel will be provided a copy of this QA Project Plan and be given an orientation session on the QA requirements for this project.

All EG&G RFP and subcontractor personnel working on ER field activities are also required to complete the OSHA 40-hour Hazardous Waste Site Safety Training or the OSHA 8-hour Hazardous Waste Site Safety Refresher course (required by 29 CFR 1910.120). In addition, all supervisory personnel are required to complete the OSHA 8-hour Hazardous Waste Site Supervisor Safety course.

Site safety training consistent with the requirements found in the project Health and Safety Plan will also be conducted. All project participants who perform ER field activities for this project must be indoctrinated and trained in the applicable safety procedures.

APPENDIX A

DATA VALIDATION REPORTING FORMATS

DATA ASSESSMENT SUMMARY REPORT FORM INSTRUCTIONS

The top portion of the forms are self-explanatory. The data assessment summary is filled in item by item with the appropriate qualifier: V, A, R, or X as defined below. Comments are discussed in the data quality section at the bottom of the form. These may include action items which need to be mitigated by the laboratory since they will affect subsequent sample batches analyzed by the laboratory.

V = VALID

Data meets all 7 objective standards:

1. analytical methods followed
2. acceptance criteria achieved
3. sufficient number and type of QC samples analyzed
4. QC limits achieved
5. compounds and analytes correctly identified
6. equipment/instrumentation calibration criteria achieved
7. sample holding times met

A = ACCEPTABLE WITH QUALIFICATIONS

Data meets most, but not all, objective standards; primary validation criteria achieved (calibration, QC limits, method requirements, compounds and analytes correctly identified).

R = REJECTED

Data fails to meet objective standards; fails to meet primary validation criteria.

X = PROBLEMS

Problems are discussed as indicated in the comments column. Laboratory is requested to mitigate problems so as not to affect subsequent sample batches.

EG&G ER Department
Rocky Flats Plant

(___/___/90)

ER DEPARTMENT DATA ASSESSMENT
SUMMARY REPORT FORM

Batch No. _____ Site _____
Laboratory _____ No. of Samples/Matrix _____
SOW# _____ Reviewer Org. _____
Sample Numbers _____

Data Assessment Summary

	ICP	AA	Hg	CN	Comments
1. Holding Times					
2. Calibrations					
3. Blanks					
4. ICP Interference Check Sample		N/A	N/A	N/A	
5. Lab Control Sample Results					
6. Duplicate Sample Results					
7. Matrix Spike Sample Results					
8. Method of Standard Addition	N/A		N/A	N/A	
9. Serial Dilution		N/A	N/A	N/A	
10. Sample Verification					
11. Other QC					
12. Overall Assessment					

V = Data had no problems. N/A = Not applicable.
A = Data acceptable but qualified due to problems.
R = Data rejected.
X = Problems, but do not affect data.

Data Quality: _____

EG&G ER Department
Rocky Flats Plant

(___/___/90)

ER DEPARTMENT DATA ASSESSMENT
SUMMARY REPORT FORM

SDG No. _____ Site _____
Laboratory _____ No. of Samples/Matrix _____
Method _____ Reviewer Org. _____
Sample Numbers _____

Data Assessment Summary

	Fluoride	Alkalinity	Chloride	Nitrate/ Nitrite	Sulfide/ Sulfate	Gravimetric	Comments
1. Holding Times	_____	_____	_____	_____	_____	_____	_____
2. Calibrations	_____	_____	_____	_____	_____	_____	_____
3. Blanks	_____	_____	_____	_____	_____	_____	_____
4. Lab Control Sample Results	_____	_____	_____	_____	_____	_____	_____
5. Duplicate Sample Results	_____	_____	_____	_____	_____	_____	_____
6. Matrix Spike Sample Results	_____	_____	_____	_____	_____	_____	_____
7. Sample Verification	_____	_____	_____	_____	_____	_____	_____
8. Other QC	_____	_____	_____	_____	_____	_____	_____
9. Overall Assessment	_____	_____	_____	_____	_____	_____	_____

V = Data had no problems. N/A = Not applicable.
A = Data acceptable but qualified due to problems.
R = Data rejected.
X = Problems, but do not affect data.

Data Quality: _____

EG&G ER Department
Rocky Flats Plant

(___/___/90)

ER DEPARTMENT DATA ASSESSMENT
SUMMARY REPORT FORM

Batch No. _____ Site _____
Laboratory _____ No. of Samples/Matrix _____
SOW# _____ Reviewer Org. _____
Sample Numbers _____

Data Assessment Summary

	VOA	Comments
1. Holding Times	_____	_____
2. GC/MS Tune/Instr.Perf.	_____	_____
3. Calibrations	_____	_____
4. Blanks	_____	_____
5. Surrogates	_____	_____
6. Matrix Spike/Dup.	_____	_____
7. Other QC	_____	_____
8. Internal Standards	_____	_____
9. Compound Identification	_____	_____
10. System Performance	_____	_____
11. Overall Assessment	_____	_____

V = Data had no problems.
A = Data acceptable but qualified due to problems.
R = Data rejected.
X = Problems, but do not affect data.

Data Quality: _____
_____
_____

EG&G ER Department
Rocky Flats Plant

(___/___/90)

ER DEPARTMENT DATA ASSESSMENT
SUMMARY REPORT FORM

Batch No. _____ Site _____
Laboratory _____ No. of Samples/Matrix _____
_____ Reviewer Org. _____
Sample Numbers _____

Data Assessment Summary

Gross a + b Analysis by Gas Proportional Counters		Comments
1. Holding Times	_____	_____
2. Initial Calibrations	_____	_____
3. Continuing Calibrations	_____	_____
4. Blanks	_____	_____
5. Lab Replicates	_____	_____
6. Lab Control Samples	_____	_____
7. QC-LLD	_____	_____
8. Size of Aliquot	_____	_____
9. Self Absorption-Recovery Factors	_____	_____
10. Sample Calculations	_____	_____
11. Overall Assessment	_____	_____

V = Data had no problems.
A = Data acceptable but qualified due to problems.
R = Data rejected.
X = Problems, but do not affect data.

Data Quality: _____
_____
_____

Radiochemical Data Completeness
Checklist for Radiometric and Gross a & b Analyses
of Soil and Water by Gas Proportional Counters

A. _____Case Narrative
- _____Abnormalities explained
- _____Matrix Problems explained
- _____Instrument problems explained
- _____Improper collection, storage, preservation, container explained
- _____Hold times met, explained if not met

B. _____Initial Calibration Data Package
- _____Detector ID
- _____Analyst initials
- _____Date, Time calibrated
- _____Current Batch Date
- _____Name, Activities, Dates of Certification of all NBS standards
- _____Voltage settings, gain settings, or plot of voltage versus std CPMs
- _____Plots of net std CPMs versus gain settings at voltage giving highest net CPM to gain ratio (crosstalk plot)
- _____Last service or repair date for detector

C. _____Continuing Calibration Data Package:
- _____Detector ID
- _____Analyst initials
- _____Date, Time of calibration check
- _____Name, Activities, Dates of Certification of check standards
- _____CPMs observed, count duration, mean counts
- _____Control chart means (copy of control charts)
- _____Background CPMs observed, results of chi square test
- _____Mean of Last 10 background check sand allowable limits
- _____Raw data from counter to verify crosstalk values

D. _____Blanks Data Package
- _____ID number of each detector the blank is counted in
- _____Date, Times of counts
- _____Samples and IDs in the set with the blank
- _____Type of blank used
- _____Detection level reported

E. _____Lab Replicates Data Package
- _____Detector ID
- _____Analyst Initials
- _____Date, Time Analyzed
- _____Value obtained for sample, replicates, mean values
- _____Count Durations of samples and backgrounds
- _____Statistical Analysis of Range, Control Limits

F. _____Lab Quality Control Samples Data Package
- _____Sample ID, Detector ID
- _____Analyst initials
- _____Values obtained, true value of sample
- _____Statistical Analysis of results
- _____Name, Activities, Certification date of QC samples

G. _____Self-Absorption, Recovery Factors Data Package
- _____Linear Equation for calibration curve coefficients
- _____Copy of self-absorption curve
- _____Raw Data from counter to determine coefficients

H. _____Lower Limit of Detection
- _____Background measurements
- _____Detector ID
- _____Date, Time of count, count duration
- _____Mean background CPM over long period
- _____Calculated LLD for isotope of interest

I. _____Size of Aliquot in Gross a & b Determination Data Package
- _____Sample ID
- _____Date, Time analyzed
- _____Measured specific conductance
- _____Calculated volume of sample to deliver 100mg solids
- _____Efficiency factor used

J. _____Sample Data Package
- _____Printed report of results for sample, reruns
- _____Computer calculations
- _____Raw Data from counter, copies of notebook pages

EG&G ER Department
Rocky Flats Plant

(___/___/90)

ER DEPARTMENT DATA ASSESSMENT
SUMMARY REPORT FORM

Batch No. _____ Site _____
Laboratory _____ No. of Samples/Matrix _____
_____ Reviewer Org. _____
Sample Numbers _____

Alpha Spectrometric Analyses
Data Assessment Summary

	Iso-Us	Iso-Pus	Am^{241}	Comments
1. Holding Times	_____	_____	_____	_____
2. Initial Calibrations	_____	_____	_____	_____
3. Blanks	_____	_____	_____	_____
4. Lab Replicates	_____	_____	_____	_____
5. Lab Control Samples	_____	_____	_____	_____
6. QC-LLD	_____	_____	_____	_____
7. Recovery Factors	_____	_____	_____	_____
8. Sample Calculations	_____	_____	_____	_____
9. Overall Assessment	_____	_____	_____	_____

V = Data had no problems.
A = Data acceptable but qualified due to problems.
R = Data rejected.
X = Problems, but do not affect data.

Data Quality: _____
_____
_____

**Radiochemical Data Completeness
Checklist for Alpha Spectrometric Analyses
of Soil and Water**

A. _____Case Narrative
- _____Abnormalities explained
- _____Matrix Problems explained
- _____Instrument problems explained
- _____Improper collection, storage, preservation, container explained
- _____Hold times were met, explained if not met

B. _____Initial and Continuing Calibration Data Package
- _____Detector ID
- _____Analyst initials
- _____Date, Time calibrated
- _____NBS traceable standards with certification dates and DPMs
- _____Observed channel numbers of isotopes of interest
- _____Book values for proper channel numbers of isotopes of interest
- _____Voltage settings, gain settings
  FWHMs in spectra, peak heights
  Results of chi square test for background
- _____Background data on regions of interest (ROI) for each detector

C. _____Blanks Data Package
- _____ID number of each detector blank is counted in
- _____Analyst initials
- _____Date, Times of counts
- _____Number and ID of samples included with the blank
- _____Type of method blank used, LLD of method

D. _____Replicate Sample Data Package
- _____Internal Recovery Factors
- _____Efficiency determined experimentally, copy of raw data,
  DPM values of check standards
- _____Detector ID
- _____Analyst Initials, Date, Time of count
- _____Isotopic Tracer used and DPM value
- _____Certification Date of Tracer
- _____Net CPM obtained
- _____Count duration
- _____Overall Efficiency Factor
- _____Instrument Efficiency
- _____Calculated Chemical Recovery

E. _____Lab Control Samples Data Package
- _____Sample ID, Detector ID
- _____Analysts' Initials
- _____Values obtained, true value of sample
- _____Statistical analysis of results

F. _____Lower Limits of Detection
- _____Background measurements
- _____Detector ID
- _____Date and time of count, counting duration
- _____Mean background CPM over long period
- _____Calculated LLD for isotope of interest

G. _____Internal Recovery Factors
- _____Efficiency determined experimentally, copy of raw data, DPM values of check standards
- _____Detector ID
- _____Analysts' initials, Date, Time of Count
- _____Certification Date of Tracer
- _____Net CPM obtained
- _____Count Duration
- _____Overall Efficiency Factor
- _____Instrument Efficiency
- _____Calculated Chemical Recovery

H. _____Sample Data Package
- _____Printed report of results for sample, reruns
- _____Computer calculations

EG&G ER Department
Rocky Flats Plant

(___/___/90)

ER DEPARTMENT DATA ASSESSMENT
SUMMARY REPORT FORM

Batch No. _____ Site _____
Laboratory _____ No. of Samples/Matrix _____
SOW# _____ Reviewer Org. _____
Sample Numbers _____

Data Assessment Summary

	BNA	Comments
1. Holding Times		
2. Calibrations		
3. Blanks		
4. Lab Control Sample Results		
5. Spike/Dup. Sample Results		
6. Duplicate Results		
7. Other QC		
8. Internal Standards		
9. Sample Results Quantitation		
10. System Performance		
11. Overall Assessment		

V = Data had no problems.
A = Data acceptable but qualified due to problems.
R = Data rejected.
X = Problems, but do not affect data.

Data Quality: _____

EG&G ER Department
Rocky Flats Plant

(___/___/90)

ER DEPARTMENT DATA ASSESSMENT
SUMMARY REPORT FORM

Batch No. _____ Site _____
Laboratory _____ No. of Samples/Matrix _____
_____ Reviewer Org. _____
Sample Numbers _____

Tritium Analyses by Liquid Scintillation
Data Assessment Summary

		Comments
1. Holding Times	_____	_____
2. Initial and Continuing Calibrations	_____	_____
3. Blanks	_____	_____
4. Lab Replicates	_____	_____
5. Lab Control Samples	_____	_____
6. QC-LLD	_____	_____
7. Quench and Efficiency	_____	_____
8. Sample Calculations	_____	_____
9. Overall Assessment	_____	_____

V = Data had no problems.
A = Data acceptable but qualified due to problems.
R = Data rejected.
X = Problems, but do not affect data.

Data Quality: _____
_____
_____

Radiochemical Data Completeness
Checklist for Tritium Analyses of Soil and Water

A. _____Case Narrative
- _____Abnormalities explained
- _____Matrix Problems explained
- _____Instrument problems explained
- _____Improper collection, storage, preservation, container explained
- _____Hold times met, explained if not met

B. _____Initial and Continuing Calibration Data Package
- _____Detector ID with Program Settings
- _____Date of Performance Check
- _____Batch Number
- _____NBS Traceable Standards with Certification Date and DPMs
- _____Quench Monitor Values and CPM for Standard used to check long term performance of cocktail and instrument
- _____Background-Blank vials CPM Results

C. _____Blanks Data Package
- _____Detector ID
- _____Date Analyzed
- _____Collection Date
- _____Sample IDs counted with blank
- _____Detection Level reported

D. _____Lab Replicate Data Package
- _____Detector ID
- _____Date Analyzed
- _____Collection Date
- _____Value obtained for sample, replicates, mean values
- _____Count Durations of samples and backgrounds
- _____Statistical analysis of Range, Control Limits

E. _____Lab Control Samples Data Package
- _____Sample ID, Detector ID
- _____Values obtained, true value of sample
- _____Statistical Analysis of Results

F. _____Lower Limits of Detection
- _____Background measurements
- _____Detector ID
- _____Date of count
- _____Calculated LLD comparison with Required Detection Level

G. _____Quench and Efficiency
- _____Quench Monitor used
- _____Quench Monitor Values and Efficiency Values
- _____Detector ID
- _____NBS traceable standards with certification date and DPM
- _____Batch number and sample IDs; Efficiency standard and backgrounds used
- _____Volume added to cocktail
- _____Cocktail used
- _____Vials used

H. _____Sample Data Package
- _____Printed Report of results for sample, reruns
- _____Computer calculations
- _____Analyst initials
- _____Raw data from counter, copies of notebook pages

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Quality Assurance Project Plan OU 1,2 Issue 0, Dated 5/14/90 Page 1 of 7

Reviewer Name(s): Colorado Department of Health

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1	4	The location of Rocky Flats Plant is illegible.	Figure 2-1 will be replace by a more legible copy.
2	3	The RFP falls under regulation of the Colorado Hazardous Waste Act (CHWA) for treatment, storage and corrective action.	Section 2.1, third paragraph, add the following: "The RFP is currently regulated under the Colorado Hazardous Waste Act (CHWA) for treatment, storage and corrective actions."
3	5	An additional objective of the IM/IRA plan is to be consistent with the final remedy at the site.	In Section 2.3 add the following to the end of the first bullet: "This must be consistent with the final remedy at the site."
4	8	The last sentence should read ..."reports directly to the 'ER' not 'ED' Department Director."	In Section 3.2.1 change the last sentence to read: "... ER Department Director."
5	8 11 12	The HSC will have stop work authority. Please include a list of other personnel with "stop work" authority.	In section 3.2.1 add the following after the last sentence: "The ER Department Director will have overall authority to stop work." In Section 3.2.2 add the following after the last sentence: "The ER Division Manager will have stop work authority." In Section 3.2.3 add the following to the end of the fourth sentence: "... , and will have stop work authority." In Section 3.2.6 add the following to the end of the last sentence: "... and has stop work authority in matters adverse to quality." In Section 3.2.7 add the following to the end of the last sentence: "... and will have stop work authority."

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Quality Assurance Project Plan OU 1.2 Issue 0. Dated 5/14/90 Page 2 of 7

Reviewer Name(s): Colorado Department of Health

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
6	11	If "real time" data from air analysis was available, specify how long it would take for the project manager to get this information.	In Section 3.2.5 second to last sentence, add the following: "Once air monitoring samples have been analyzed and reduced they will be reported immediately to the Project Manager."
7	16	The names of the samplers must be recorded.	In Section 4.3.1 add the following to the bottom of the list at the bottom of the page: "Name of sample collectors"
8	21	The variable DP_t is one variable with two definitions. One of them needs to be redefined and fixed in the completeness equation.	In the completeness formula change the first DP_t to DP_i.
9	24	Figure 5-1 is illegible.	Replace Figure 5-1.
10	27	How much variation is expected in the specific hydraulic conductivity of each individual bedrock sandstone unit? If three orders of magnitude or more is expected, the sampling and determination of hydraulic conductivity procedure needs to be overhauled.	In Section 5.2, add the following to the seventh bullet: "Hydraulic variations within the same sandstone units are expected, however they should not exceed three orders of magnitude. If variations in hydraulic conductivities vary greater than three orders of magnitude, major modifications in the drain design will be needed. The quantification of these intervals is not within the scope of the IRA geotechnical drilling. Detailed analysis of these intervals will then be performed in future remedial investigations."

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Quality Assurance Project Plan OU 1.2 Issue 0. Dated 5/14/90 Page 3 of 7

Reviewer Name(s): Colorado Department of Health

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
11	30	The samples are in the custody of samplers until released to the drilling contract project manager. Otherwise, the drilling project manager would need to be onsite as samples are collected.	In Section 6.0 change the fifth sentence of the first paragraph to read as follows: "The field samplers are responsible for sample custody and transfer of custody to the Drilling Contractor Project Manager. The Drilling Contractor Project Manager is responsible for training and oversight of field samplers in accordance with chain of custody procedures."
12	31	The flow chart shows that sample preservation occurs after the samples are collected. The chart contradicts the actual practice observed during CDH inspections.	Insert the following footnote on Figure 6-1: "Preservation of soil samples is limited to cooling the samples in a chilled environment. All samples collected are immediately placed in an iced cooler."
13	31	The possible disposition of samples after screening must be shown.	Change the block in Figure 6-1 to read "Receipt at Subcontract Laboratory Licensed for >100 pic/L."
14	41	The table must specify the holding times for filtered/unfiltered and preserved/unpreserved water samples.	Section 7.4: Add statement to end of paragraph : The holding times specified in Table 7-9 and 40CFR136 are for water samples. These holding times will be used as advisory guidance for soil sampling analysis. Specific holding times for filtered/unfiltered and preserved/unpreserved samples will be in accordance with 40CFR136."
15	45	A list of all data categories that will be validated must be provided.	In Section 9.2 insert a second paragraph that reads as follows: "Data validated includes the analytes listed in sections 4.3.2 through 4.3.7 of this document."

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Quality Assurance Project Plan OU 1,2 Issue 0, Dated 5/14/90 Page 4 of 7

Reviewer Name(s): Colorado Department of Health

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
16	45	The sentence reads, "After data validation into tables or arrays, the Field QC Coordinator will review data sets for anomalous values. Any inconsistencies will be resolved by seeking clarification from the field personnel responsible for data collection." The Field QC Coordinator has no business "resolving" anomalous data, if "resolution" has anything to do with altering the numbers. The field personnel responsible for sample and data collection should be noting, in ink in the log book, any unusual circumstances that occur at the time data is collected. All unusual circumstances should be noted with the appropriate data point until all data for a sample has been collected and only then under statistically appropriate scrutiny should "anomalous data be "resolved."	In Section 9.2.1 paragraph one, replace the last sentence with: "Any inconsistencies discovered should be annotated by data collection personnel in the field log book at the time the data is collected, to explain any anomalous values."
17	47	Specify whether turnaround time is working days or calendar days. Turnaround time for data validation must be specified.	"Turnaround time" is to be based on calendar days. "Calendar Days" has been added to Table 9-1 header. Also, "Turnaround Time" has been changed to "Sample data Package" and a new column titled "Supporting Documentation" has been added.

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Quality Assurance Project Plan OU 1,2 Issue 0, Dated 5/14/90 Page 5 of 7

Reviewer Name(s): Colorado Department of Health

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
18	48	Duplicate samples are not to be split in order to minimize disturbance and possible volatilization of contaminants. A second sample must be taken instead.	Insert in Section 10.1.1 the following statement: "Volatile samples are collected using three inch stainless steel liner secured directly behind the shoe of a modified California split barrel sampler. The liner is immediately covered with teflon sheet, capped and taped to minimize the loss of volatiles. Duplicate samples are collected by using a similar barrel which has been adapted so two three inch stainless steel liners can be secured directly behind the shoe."
19	49	A trip blank for all parameters in addition to radionuclides is necessary.	In Section 10.1.3 add the following as a second paragraph: "Trip blanks will not be used during the shipment of soil samples. Unlike water samples, commercially available blank soils which adequately reflect the various soil types encountered within each borehole are not available. Development of blank soil types within the RFP region is not practical due to the subjectivity of background soil conditions."
20	60	Audit reports must also be retained in the QA file.	In section 15.0 the various types of audit reports are listed in the fourth bullet.
21	55-56	List the criteria used to separate analytical data into the three categories of V, A, and R.	Section 13.3 has been expanded to give a detailed explanation of data validation criteria.
22	61	Audit reports must be maintained to support the project manager in documenting QA activities.	In Section 16.0 add "Reports" to the end of bullets 2 & 3. Add a seventh bullet that states "All other Audit Reports."

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Quality Assurance Project Plan OU 1.2 Issue 0. Dated 5/14/90 Page 6 of 7

Reviewer Name(s): Colorado Department of Health

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
23	App. A	What is the source or reference of these strange looking forms? If you have any latitude in the design and use of these forms, it may be appropriate to allow the lab to design a form specific to each type of test, with the data validation information extracted somewhere on the form. It is not clear whether the blank spaces are to contain numbers or just be checked off. It is also not clear whether or not each data point has one of these forms associated with it.	A data assessment summary report form instruction sheet has been placed at the front of Appendix A to clarify how the forms are to be filled out. These forms are to be used for this project to assure that validation is standardized. The formats used for data validation reporting are facsimiles of forms found in EPA's laboratory data functional guidelines. The purpose of the blank spaces beside each validation criterion are for indicating whether the criteria examined were found to be "V"-Valid, "A"-Acceptable with qualifications, or "R"-Rejected. The actual criteria (e.g., spike recovery windows) are specified in RFP data validation guidelines. For validating CLP Organic and Inorganic data, EG&G Rocky Flats employs the following EPA guidance: 1. EPA, Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses, 7/1/88. 2. EPA, Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses, 2/1/88. Copies of these guidelines may be obtained from Deanna Peterson of EPA Region VIII Laboratory (Building 53 Denver Federal Center). For non-CLP analyses such as water quality (e.g., chlorides, nitrates, etc.) and radiochemistry, EG&G Rocky Flats has developed data validation guidelines specific to the requirements found in our sampling and analysis Statements of Work and the particular standard methods used to perform the work. These non-CLP data validation

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Quality Assurance Project Plan OU 1,2 Issue 0, Dated 5/14/90 Page 7 of 7

Reviewer Name(s): Colorado Department of Health

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
			guidelines parallel the approach used by EPA in their functional guidelines.

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Quality Assurance Project Plan OU 1.2 Issue 0. Dated 5/14/90 Page 1 of 2

Reviewer Name(s): United States Environmental Protection Agency

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1	25	Section 5.1 outlines the approach and key assumptions which are to be followed to meet the objectives of the drilling program. It is stated that no geochemical analyses or packer test will be taken from the borings along the influent/effluent line. This is not in accordance with the January, 1990 Final IM/IRA Plan and Decision Document. Within the Final Decision Document it stated that soils will be sampled along the proposed piping alignment in order to determine the final disposition of the excavated soils.	In Section 5.1 replace second to last bullet with: "The alignment of the influent/effluent line is very near SWMUs, therefore all cuttings will be contained in 55 gallon drums. Continuous core augering will be conducted for all boreholes along the alignment. In order to characterize the soils for excavation purposes a composite sample will be collected over the first ten feet. This sample will be analyzed for all chemical parameters consistent with soil analysis along the French Drain except volatiles. Discrete volatile samples will be collected in 3-inch long liners from depths of 2 and 6 feet."
2	26	Abandonment of boreholes must be in accordance with applicable requirements.	In Section 5.1 replace the third bullet with: "Boreholes will be abandoned by grouting the hole with cement bentonite slurry. This will be done with a tremie pipe method for all boreholes as soon as possible after hydraulic tests are completed in accordance with applicable requirements."
3	28	Within Section 5.2 it is stated that back pressure permeability tests will be performed on approximately 10 bedrock units. Is this statement supposed to state that back pressure permeability tests will be performed on approximately 10 bedrock samples?	In Section 5.2 in the fifth bullet replace statement with: "Backpressure tests will be performed on approximately 10 bedrock samples."

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Quality Assurance Project Plan OU 1,2 Issue 0, Dated 5/14/90 Page 2 of 2

Reviewer Name(s): United States Environmental Protection Agency

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
4	29	Section 5.2 states that double packer tests will be conducted at various intervals within the bedrock portion of the boreholes. This statement must be justified in light of the fact that the January, 1990 Final Decision Document states that single packer injection apparatus will be used.	In Section 5.2 at the first bullet, delete the double packer reference and insert: "Double packer tests were initially performed in an effort to save time and money. The double packer method did not work consistently because many boreholes collapsed after the drill pipes was removed. Single packer tests will be performed for the remaining boreholes as described in the Final Decision Document. Test intervals with this method progress in depth as boreholes are advanced. This method will limit the length of open hole and reduce the caving problems encountered with the double packer tests." In Section 5.2 at the fourth bullet, replace "double" with "single."
5	29	Section 5.2 states that temporary casings will be installed to insure that the borehole stays open prior to conducting the packer testing. A conservative maximum time limit should be placed on the period between completing the borehole and performing the packer test so as to minimize the potential for migration of contaminants from the alluvial system into the bedrock system.	In Section 5.2 at the first bullet, delete the existing statement and insert: "Temporary casings will be installed in the alluvial material after bedrock has been encountered. The alluvial casings will be installed using a cement/bentonite slurry and 4-inch PVC pipe. All bedrock drilling will be performed through this alluvial casing using conventional water wash rotary techniques. Single packer tests will be performed every five feet as the hole advanced. These alluvial casings are considered temporary since the boreholes will be grouted to the surface after completion of all hydraulic testing. However, since the bedrock/alluvial contact will be adequately sealed there is time constraint on borehole completion."

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: QA Project Plan (Drilling) OU1.2, Issue 0, Dated 5/14/90 Page 1 of 1

Reviewer Name(s): Brent Lewis/Jim Koffer

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1	11	Add statement requiring Project Manager to have daily contact and interaction with DOE Site Manager in accordance with IAG.	Inserted into Section 3.2.3: "Additionally, he will have daily contact and interaction with the appointed DOE Site Manager in accordance with IAG."
2	11	Add statement requiring Project Manager to 1.) perform daily testing for adequate soil moisture to prevent dust and/or resuspension; 2.) check concentration levels during operations on days of earth moving or other dust generating activity.	Inserted into Section 3.2.3: "The Project Manager shall have soil moisture testing done daily to ensure adequate soil moisture exists to prevent dust resuspension and on days of earth moving (or other dust generating activities) have concentration levels checked during operation."

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: QA Project Plan (Drilling) OU1,2, Issue 0, Dated 5/14/90 Page 1 of 2

Reviewer Name(s): Mike Freehling EG&G

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1	18	In Section 4.3.7 add: Data needed to determine the existing geptechnical conditions at the proposed locations of the French Drain and influent/effluent lines are as follows: 1. Classification of the soil and bedrock for engineering purposes. 2. Shear strength of the soil and bedrock. 3. Unconfined compressive strength of the soil. 4. Permeability of the soil and bedrock. These data will provide the information necessary for the proper design and construction of the French Drain and influent/effluent lines.	Inserted directly.

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: QA Project Plan (Drilling) OU1.2, Issue 0, Dated 5/14/90 Page 2 of 2

Reviewer Name(s): Mike Freehling EG&G

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
2	53	In Section 12.2 add: ASTM D-422 Particle-Size Analysis for Soils ASTM D-1586 Penetration Test and Split-Barrel Sumpling of Soils ASTM D-2166 Tests for Unconfined Compressive Strength of Cohesive Soils ASTM D-2487 Classification of Soils for Engineering Purposes ASTM D-2488 Description of Soils ASTM D-3080 Direct Shear Test of Soils ASTM D-2856 Triaxial UU ASTM D-2938 Unconfined Confined Compressive Strength of Intact Rock Core Specimens ASTM D-4318 Atterberg Limits ASTM D-2216 Laboratory Determination of Moisture Content ASTM D-854 Specific Gravity of Soils EPA 1900 Back Pressure Permeability ASTM D-2937 Density of Soil in Place	Inserted directly.

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Quality Assurance Project Plan (Drilling) OU 1.2 Issue 0. Dated 5/14/90 Page 1 of 2

Reviewer Name(s): Wanda Busby (EG&G)

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1	4	Figure 2-1, a new map needs to be provided.	A new map was provided.
2	3	Determine if RFP is still administered by DOE's Albuquerque office.	Replace with "Rocky Flats Office (RFO) of the U.S. Department of Energy."
3	8	Typo - change "ED" to "ER."	Changed "ED" to "ER."
4	11	The Air Programs Representative function description sounds as if has to be at the site at all times.	Changed the AP Representative description to be consistent with that in the Project Management Plan.
5	12	The QA Officer's reporting responsibility is incorrect.	Changed the QAO reporting to the ER Department Director.
6	14	Section 4.1.1d - first sentence doesn't make sense. Add "and" to the last sentence.	Corrected to read "The DOE/RFO is charged with supervising the ER program at Rocky Flats.
7	16	Section 4.3.2 - change "to" to "with."	Changed "to" to "with."
8	17	Section 4.3.6 - replace "Meteorological data" with "Radioactive ambient air."	Replaced "Meteorological data" with "Radioactive ambient air."
9	19	Section 4.4 - Questioned "with qualification."	Improved punctuation for greater clarity.
10	24	Replace Figure 5-1 with more legible copy.	Replaced Figure 5-1.
11	25	Section 5.1 - add "and."	Added "and" before "split spoon ..."

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Quality Assurance Project Plan (Drilling) OU 1,2 Issue 0, Dated 5/14/90 Page 2 of 2

Reviewer Name(s): Wanda Busby (EG&G)

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
12	26	Section 5.1 - replace "monitoring" with "program."	Replace "monitoring" with "program."
13	28	Section 5.1 - replace "monitoring" with "program."	Replace "monitoring" with "program."
14	41	Section 7.4 - modify Table 7-9.	Modified Table 7-9. Deleted "TSP", changed "Air Radionuclides" to Radioactive Ambient Air" and added "Soil Radionuclides."
15	41	Section 7.5 - replace "soil" with "sample."	Replaced "soil" with "sample."
16	57	Change "Division" to "Department."	No change. McKinley has not resolved this issue.
17	61	Replace "program manaject" with "Project Manager."	Replaced "Program Monaject" with "Project Manager."

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Quality Assurance Project Plan OU 1,2 Issue 0. Dated 5/14/90 Page 1 of 1

Reviewer Name(s): Karen Schoendaller (EG&G)

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1	45	In Section 9.2 add the following: "Data validation includes the analytes listed in Section 4.3.2 through 4.3.5."	Added to Section 9.2: "Data validation includes the analytes listed in Section 4.3.2 through 4.3.7." (See Mike Freehling's comment.)
2	47	Change Table 9-1 to include "Calendar Days" in the header. Also, change "Turnaround Time" to "Sample data Package" and add a new column titled "Supporting Documentation".	"Calendar Days" has been added to Table 9-1 header. Also, "Turnaround Time" has been changed to "Sample data Package" and a new column titled "Supporting Documentation" has been added.
3	55	Add a new section to Section 13.3 titled "Data Validation Criteria."	Added new section to Section 13.3.
4	A-2	Add an explanation page to the Appendix in front of the forms.	Added a page to the Appendix explaining how to use the forms (see attached pages).

QUALITY ASSURANCE PROJECT PLAN
for the
INTERIM REMEDIAL ACTION
OPERABLE UNIT 1
881 HILLSIDE, PHASE 1-A
Construction

ENVIRONMENTAL RESTORATION PROGRAM
ROCKY FLATS PLANT
GOLDEN, COLORADO

Reviewed for UCNI
TL

"REVIEWED FOR CLASSIFICATION
By [signature]
Date 6/6/90

"REVIEWED FOR CLASSIFICATION/UCNI
By B. L. MILLER
Date 6-12-90"

QUALITY ASSURANCE PROJECT PLAN
for the
INTERIM REMEDIAL ACTION
OPERABLE UNIT 1
881 HILLSIDE, PHASE 1-A, Rocky Flats Plant
Construction

POLICY

This Quality Assurance Project Plan identifies and documents the applicable Quality Assurance Requirements that apply to the Rocky Flats Plant Interim Remedial Action for the 881 Hillside, Phase 1-A. Construction work performed on this project must be in compliance with the requirements contained herein.

Approvals:

K. B. McKinley, Director
Environmental Restoration — 6/6/90 Date

J. R. Majestic, Director
Health and Safety — 6/8/90 Date

D. W. Ferrera, Director
Support Services — 6/9/90 Date

Tom Greengard, Manager
Environmental Restoration — 6/6/90 Date

J. P. Koffer, Project Manager — 6/6/90 Date

Linda Rock, QA Officer — 6/6/90 Date

TABLE OF CONTENTS

FIGURES

1.0 INTRODUCTION

The purpose of this Quality Assurance Project Plan (QA Project Plan) is to identify the QA Requirements that are applicable to the Rocky Flats Plant (RFP) Interim Remedial Action (IRA), 881 Hillside, Phase 1-A scope of work for construction.

2.0 SCOPE OF APPLICATION

This QA Project Plan is applicable to the RFP IRA, 881 Hillside, Phase 1-A construction work. This work generally includes the following task:

- Grade preparation and foundation and slab installation for a pre-engineered building (#891).

3.0 REVISIONS

This QA Project Plan is maintained and issued by the EG&G, Environmental Restoration (ER) Quality Assurance Officer (QAO) for the Rocky Flats ER Program. It will be revised as required to meet the needs of the project. Revisions will require approvals at the same level as the original document.

4.0 IMPLEMENTING ORGANIZATIONS

This section describes the role of EG&G RFP personnel and personnel from subcontractors for the 881 Hillside operable unit construction activities.

Quality control (QC) and management organization and responsibilities are illustrated in Figure 1. EG&G RFP personnel will provide the primary project management and quality assurance (QA) oversight. Garcia Construction will be responsible for construction activities.

4.1 Responsibilities of Key Participants

The overall management responsibility for the work governed by this QA Project Plan is illustrated in Figure 1. This organization includes ER functions as well as Engineering and Project support functions. Figure 2 illustrates staff responsibilities for carrying out specific tasks associated with the project. This includes the Project Manager, the Construction Coordinator, Health and Safety Coordinator (HSC), Project Engineer, and the QAO.

Figure 1

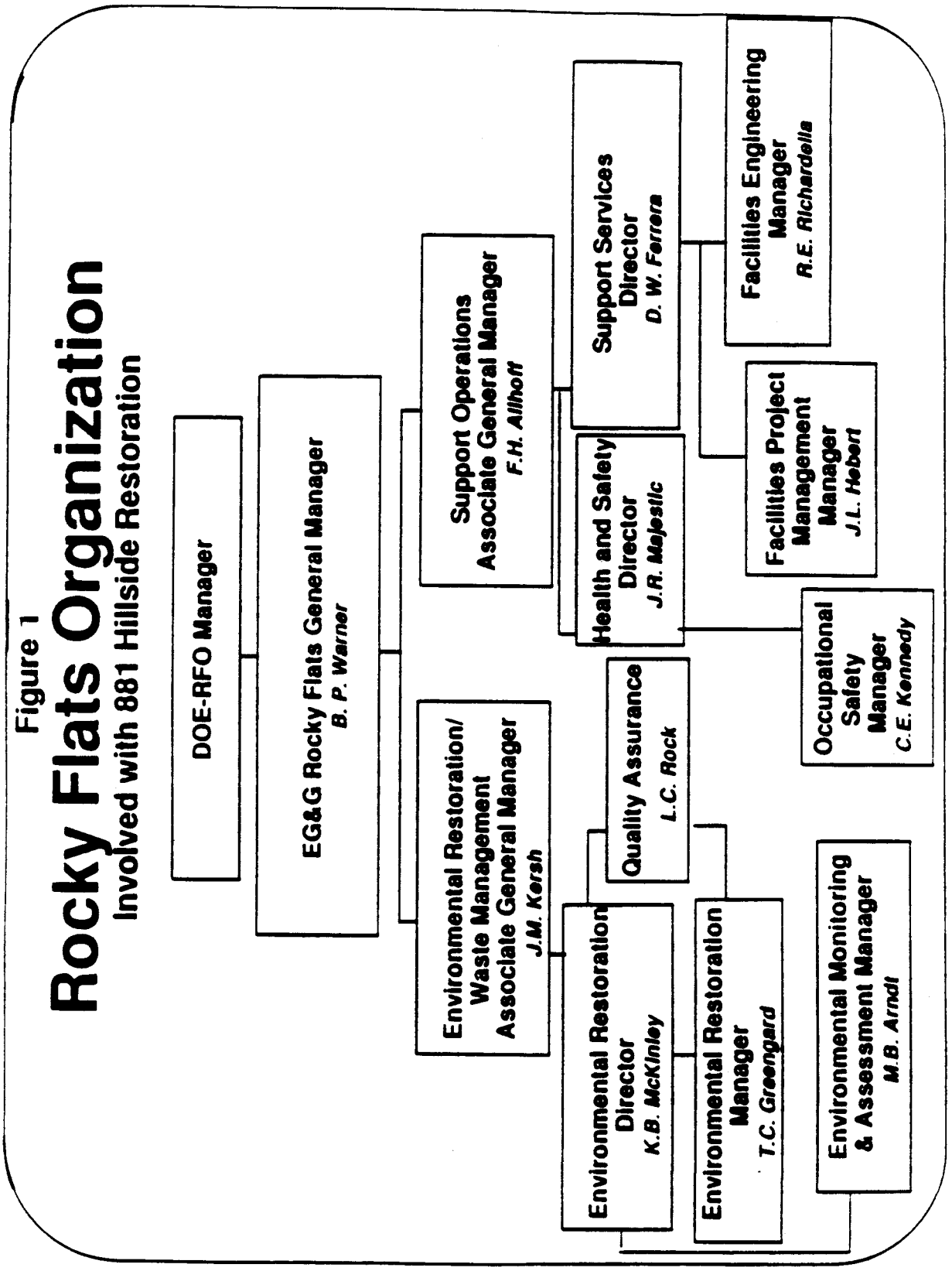
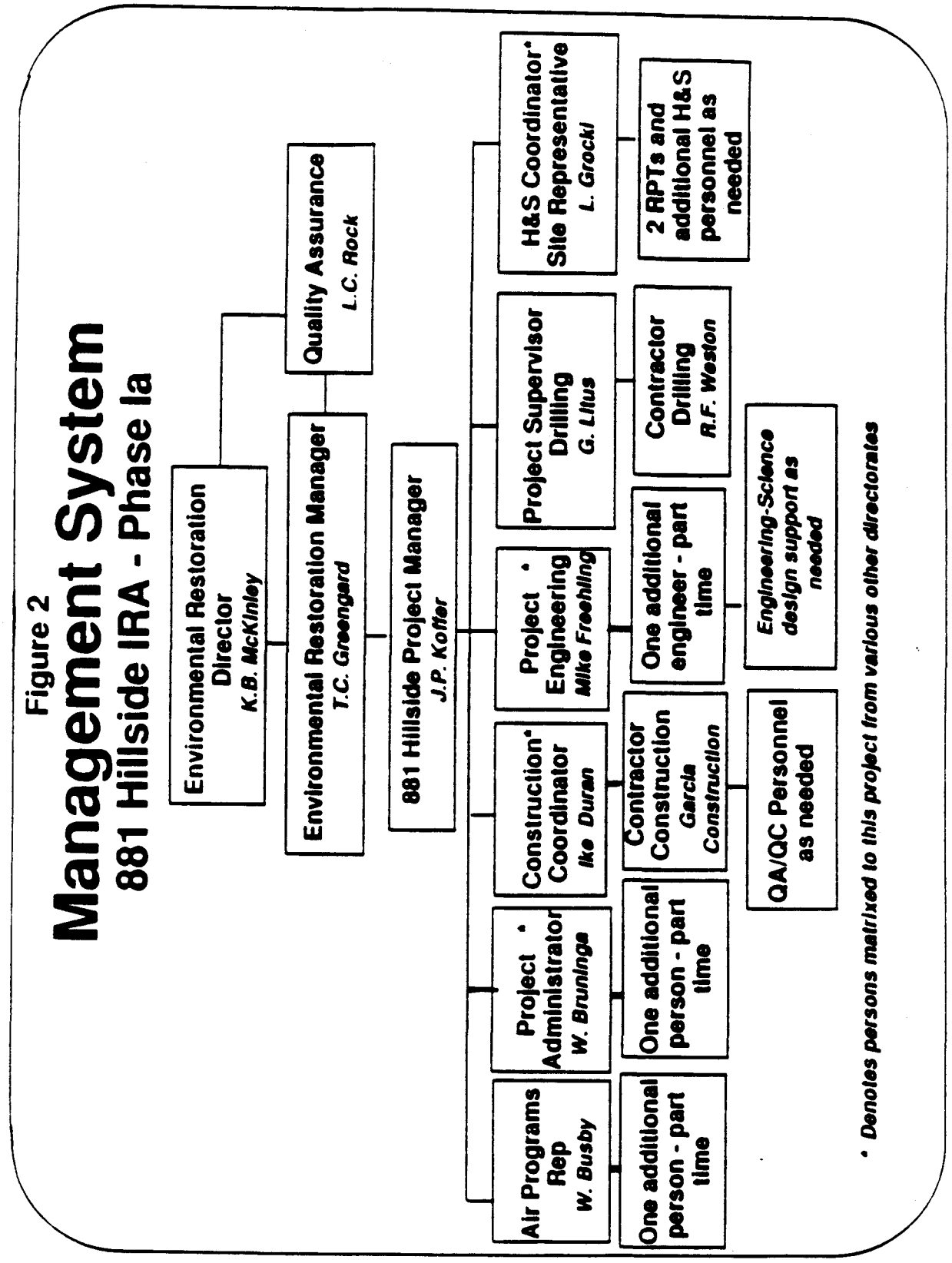

Rocky Flats Organization
Involved with 881 Hillside Restoration
DOE-RFO Manager
EG&G Rocky Flats General Manager
B. P. Warner
Support Operations
Associate General Manager
F.H. Allhoff
Environmental Restoration/
Waste Management
Associate General Manager
J.M. Kersh
Support Services
Director
D. W. Ferrera
Facilities Engineering
Manager
R.E. Richardella
Health and Safety
Director
J.R. Majestic
Facilities Project
Management
Manager
J.L. Hebert
Occupational
Safety
Manager
C.E. Kennedy
Quality Assurance
L.C. Rock
Environmental Restoration
Director
K.B. McKinley
Environmental Restoration
Manager
T.C. Greengard
Environmental Monitoring
& Assessment Manager
M.B. Arndt

Figure 2

Management System
881 Hillside IRA - Phase Ia



The duties of all key personnel associated with this project are presented in this section. All key personnel are listed in Figure 1 of this section.

Environmental Restoration Department Director

The ER Department Director is responsible for the overall direction of the Environmental Restoration, Environmental Monitoring and Assessment, Clean Water, Clean Air and NEPA functions of the ER Department. The ER QAO reports directly to the ER Department Director.

Environmental Restoration Division Manager

The ER Division Manager is responsible for implementing ER-related construction activities, QA project plans, corrective actions as necessary and for providing overall direction and guidance to the Project Manager.

881 Hillside Project Manager

The Project Manager is assigned from the EG&G ER Division and reports to the Manager of ER. The Project Manager is responsible for preparing project activities; monitoring health and safety documents and communicating project requirements including any modifications to the project scope to the support organizations. Support groups include: Facilities Project Management, Environmental Monitoring and Assessment, ER, Facilities Engineering, Health and Safety, and the subcontractor, Garcia Construction. The Project Manager will also measure project progress, monitor the budget, evaluate project performance, ensure compliance to H&S issues and serve as liaison with DOE/RFO, EPA, and CDH, and will have stop work authority for the project. The work will be performed under the day-to-day oversight of the EG&G manager according to the project schedule. All work will be performed under applicable health and safety requirements and in compliance with the 881 Phase 1-A Health and Safety Plan. The Project Manager shall have soil moisture testing done daily to ensure adequate soil moisture exists to prevent dust resuspension and on days of earth moving (or other dust generating activities) have concentration levels checked during operation.

Construction Coordinator

The Construction Coordinator is assigned to the project by the Facilities Project Management and reports to the Project Manager. The Construction Coordinator is responsible for implementing all construction-related project activities including overseeing the construction, ensuring compliance with construction compliance, and ordering and verifying construction QC tests. All construction activities will be conducted in

accordance with EG&G-provided contract specifications and engineering drawings, and Statements of Work and the contractors plan. The Construction Coordinator is responsible for monitoring and verifying resolution of any corrective action taken. The Construction Coordinator is responsible for contractor compliance to H&S requirements, tracking construction activities through observations and test measurement reports. The Construction Coordinator is responsible for notifying the Project Manager, Contract Administrator, and Project Engineer of any conditions that may adversely impact the quality of project activities.

In addition, the Construction Coordinator shall determine if soil is moist enough to prevent dust generation, and if necessary, require the construction coordinator to wet down the area before any additional work is done. He will also determine if the soil is too moist for construction to continue and stop work if required. The Construction Coordinator shall also watch the site anomemeter and stop work according to wind speed shutdown criteria.

H&S Site Coordinator

The Health and Safety Coordinator (HSC) is assigned to the project by Health and Safety and reports to the Project Manager. The HSC is responsible for coordinating all health and safety-related activities of the project including securing the services of health physicists, industrial hygienists, Radiation Protection Technicians (RPTs) and safety engineers as necessary. The HSC will monitor requirements as provided in the Health and Safety Plan. The performance-based training department will provide health and safety-related training, as necessary, to EG&G employees and subcontractor personnel involved in the Phase 1-A, 881 Hillside area IRA. The HSC will ensure that radiologic and industrial hygiene measurements are taken, monitor construction activities for personnel protection and industrial safety considerations, and will have stop work authority.

Project Engineer

The Project Engineer is assigned to the project by the Facilities Engineering and reports to the Project Manager. The Project Engineer is responsible for supporting the procurement of services of an engineering design firm, preparation of engineering design plans and construction specifications (completed for Phase 1-A), preparation and reviewing of field change orders and any associated plans and specifications as directed by the Project Manager, and preparation of as-built construction drawings.

Air Programs Representative

The Air Programs Representative is assigned to the project by Environmental Monitoring and Assessment. The Air Programs group monitors meteorology and air quality for the ER Department. The Air Programs Representative is responsible for operation of Hi-volume air samplers and meterology monitors. Once air monitoring samples have been analyzed, and reduced, they will be reported immediately to the project manager. Wind conditions will be reported to the project managers, construction coordinators, drilling supervisors and the HSC as specified in the waste procedure.

Quality Assurance Officer

The QAO is assigned to the project by ER Department Director and reports to the ER Department Director. The QAO is responsible for performing QA surveillance, recommending correction to the ER Manager as necessary, reporting on the implementation of corrective actions, and maintaining QA records. The QAO is responsible for ensuring that appropriate corrective action is taken and has stop work authority in matters adverse to quality.

5.0 PROJECT QUALITY ASSURANCE LEVEL

The level of quality incorporated into this QA Project Plan has taken into consideration the potential for environmental releases, public visibility, potential regulatory concerns, and DOE Programmatic goals.

6.0 PROJECT QUALITY ASSURANCE REQUIREMENTS

Criterion 1, Quality Assurance Program

The development of the QA functions outlined in this QA Project Plan have been developed under the general guidance of the 18 criteria of 10 CFR 50, Appendix B, ANSI/ASME NQA-1, and EPA - QAMS, Guideline and Specification for Preparing Quality Assurance Project Plans, 005-80, 12-29-80 pending finalization of the ER Department Quality Assurance Program Plan (QAPP).

Criterion 2, Organization

Personnel or organizations will ensure that their assigned work is in accordance with established instructions, procedures, and drawings. The project organization is identified in Section 4.0.

Criterion 3, Design Control

The design for this project has been provided by EG&G. When required changes to the design are identified, the information will be forwarded to EG&G for transmittal to the responsible design organization. EG&G will be responsible for the control of the design, including changes. EG&G will be responsible for assuring that current and correct design documents and changes are provided.

Criterion 4, Procurement Document Control

Construction materials and items are considered to be "commercial grade" and will be procured as identified in the construction specifications.

Criterion 5, Instructions, Procedures, & Drawings

All procedures, instructions, specifications, and drawings for accomplishing construction are contained in the construction design documents for the 881 Hillside remedial action Phase 1-A construction.

Criterion 6, Document Control

EG&G will be responsible for the distribution of design documents (drawings, specifications, changes, etc.) to the contractor.

Criterion 7, Control of Purchased Items & Services

The EG&G Construction Coordinator is responsible for monitoring subcontractor compliance to the requirements of the EG&G provided design documents, and RFP requirements.

Acceptance of subcontractor work will be based on daily monitoring, review of submitted documentation, and the results of construction testing. QA surveillances will be performed to verify compliance.

Criterion 8, Identification & Control of Items & Samples

All field measurements and observations will be recorded by the Project Manager, or designee, in the Site Manager's Log Book, daily project log book, site health and safety coordinators log book, on field data forms, or similar permanent records in accordance with authorized standard operating procedures and work procedures. All entries will be recorded directly in waterproof black ink and will be legible with all entries signed and dated. If entries must be changed, a single strike through will be used which will not obscure the original entry. The reason for the change will be stated and the correction and explanation will be

signed and dated or otherwise appropriately identified at the time the correction is made. The Project Manager, or designee, will mark nonconforming entries by circling in waterproof red ink. The corrective action process described in Criterion 15 Control of Nonconformances and Criterion 16 Corrective Actions will be carried out to resolve deficient conditions.

Criterion 9, Control of Processes

This criterion is not applicable to this Project.

Criterion 10, Inspection & Surveillances

Routine oversight and monitoring of work will be performed by the EG&G Project Manager. Where appropriate, acceptance testing will be requested through EG&G's testing services. QA surveillances of in-progress work will be the responsibility of the EG&G QAO.

Criterion 11, Test Control

Tests performed on construction and construction materials will be performed by the EG&G-provided testing services. Since these test results will in part verify the quality of the work attained, the EG&G QAO is responsible for performing surveillance of the testing services to ascertain the quality of the testing performed, qualifications of personnel, and the compliance to specified test procedures.

The following testing shall be completed according to the design documents for the project.

- soil density testing
- concrete strength testing

Criterion 12, Control of Measuring & Test Equipment

Test equipment utilized by the EG&G testing service and subcontractors will be required to be calibrated. Calibration of the equipment will be verified during the work progress and will be entered into the appropriate records as described under Criterion 8.

Criterion 13, Handling, Shipping, & Storage

When hoisting or other special handling or lifting is required, the subcontractor will be required to utilize equipment that is adequate and tested, operated by experienced and trained operators. This equipment must be inspected by the HSC prior to first use.

Criterion 14, Inspection and Test Status

The requirements of this criterion are not applicable to this Project.

Criterion 15, Control of Nonconformances

Nonconforming items will be segregated or otherwise marked to indicate the status. Nonconformances in the Project Log or other forms or documents will be circled in red ink. Nonconformances will be dispositioned by completing a Nonconformance Report (NCR) (Figure 3).

Nonconformances affecting design will be forwarded to the responsible design organization through the EG&G Project Manager for concurrence of proposed dispositions. The EG&G QAO will verify completion of the disposition and make distribution of completed NCRs.

Criterion 16, Corrective Action

Corrective Action procedures will be instituted to correct any nonconformities with quality control procedures or objectives. The necessity for corrective action can be identified through noting any deficiencies during the course of project activities. The essential steps in executing a corrective action are outlined below:

- Identify and define the problem.
- Assign responsibility for investigating the problem.
- Investigate and determine the cause of the problem.
- Determine corrective action to be taken to eliminate the problem.
- Assign responsibility for implementing the corrective action.
- Implement the corrective action and document what was done.
- Verify that the corrective action taken has effectively solved the problem.

Documentation of the problem is important to the overall management of the project. A Corrective Action Report form for problems associated with project activities, Figure 4, may be initiated by any project participant. This form identifies the problem, establishes possible causes, and designates the organization responsible for taking corrective action. The ER Division Manager, or his designee, is responsible for ensuring that Corrective Action Reports are developed for identified problems and that the reports are closed out.

Figure 3

NONCONFORMANCE REPORT

EG&G ROCKY FLATS

NCR No. _____ DATE _____
QAL _____ PAGE _____ OF _____
AUTH # _____ BLDG. # _____
PROJ NCR No. _____ P.O. # _____

PROJECT _____
RESPONSIBLE DEPARTMENT _____
ITEM: _____ QUANTITY _____
SPECIFICATION REFERENCE _____
NONCONFORMANCE DESCRIPTION: _____

ISSUED BY: _____ DATE _____
Name Title Organization

MANAGER, CONST MGMT & INSPECTION _____ DATE _____

PRELIMINARY DISTRIBUTION: ☐ BLDG. MGR. ☐ MANAGER PE ☐ PROJ. ENGR. ☐ MANAGER M'TCE. ☐ CMMI MASTER FILE ☐ SEISMIC QUAL. ☐ HS&E AREA ENGR. ☐ CONSTRUCTION COORDINATOR ☐ CONTRACTOR ☐ PURCHASING ☐ FIRE PROT. ENGR. ☐ OTHER

DISPOSITION: ☐ USE-AS-IS ☐ REPAIR ☐ REWORK ☐ REJECT ☐ AS-BUILT REQUIRED

DISPOSITION APPROVALS:

PROJECT ENG. _____ DATE _____ DESIGN CHECKER _____ DATE _____
HS&E AREA ENGR. _____ DATE _____ USER _____ DATE _____
PURCHASING (IF APPL.) _____ DATE _____ FIRE PROT. ENGR. _____ DATE _____
SEISMIC QUAL. _____ DATE _____ RQA _____ DATE _____

INTERIM DISTR.: ☐ MANAGER M'TCE. ☐ CONSTR. COORD. ☐ PURCHASING ☐ CMMI MASTER FILE ☐ PROJ. ADMIN. ☐ CONTRACTOR ☐ OTHER ☐ APPROVERS

RF-44395 (Rev. 1-89) CMIC-21a

Figure 4

ER DEPARTMENT CORRECTIVE ACTION REPORT

EG&G ROCKY FLATS	Type: Field ☐ Laboratory ☐	Corrective Action Report Number: _____ Audit Date: _____ Deviation (finding/ observation): _____

Organization: _____

Location: _____

Operation : _____

Requirement (procedure reference): _____

Deviation: _____

Quality Assurance Evaluator: _____ Date: _____

Response to Request for Corrective Action

Deviation Cause: _____

Corrective Action Taken: _____

Action Taken to Prevent Deviance Recurrence: _____

Date Corrective Action Completed: _____

Corrective Action Verification: _____

Signature of Evaluator: _____ Date: _____

Corrective Action Closed by (ER Program QA Officer): _____ Date: _____

The Corrective Action Report form includes a description of the corrective action planned and has space for follow-up comments. The ER Division Manager, or his designee, will verify that action taken appears effective and then verifies that the problem has been effectively resolved. The QAO will receive a copy of all Corrective Action Report forms and will enter them into a Corrective Action Log. This permanent record will aid in follow-up and will make any quality assurance problems visible to the ER Division Manager and 881 Hillside Project Manager.

Criterion 17, Records

Contractors will be required to package and submit records of their work activities to the ER Project Manager for review. The ERPM will then forward the documents to the QA Records file. All documents from both contractors as well as EG&G describing work and quality activities for this project will be retained and controlled in the QA Records File. An additional copy of the records will be maintained at a separate location from the QA Records File. A records control function is in place to ensure that documents which demonstrate objective quality evidence are maintained and retrievable.

The documents which are retained in the QA Records file include but are not limited to:

- QA Project Plans
- Field QA Surveillance
- Field, Laboratory, and Data Validation Procedures
- Corrective Action Reports
- Data Validation Reports
- Correspondence Related to Quality Assurance Activities
- Subcontractor QA Documents
- Health and Safety Documentation.

Criterion 18, Audits

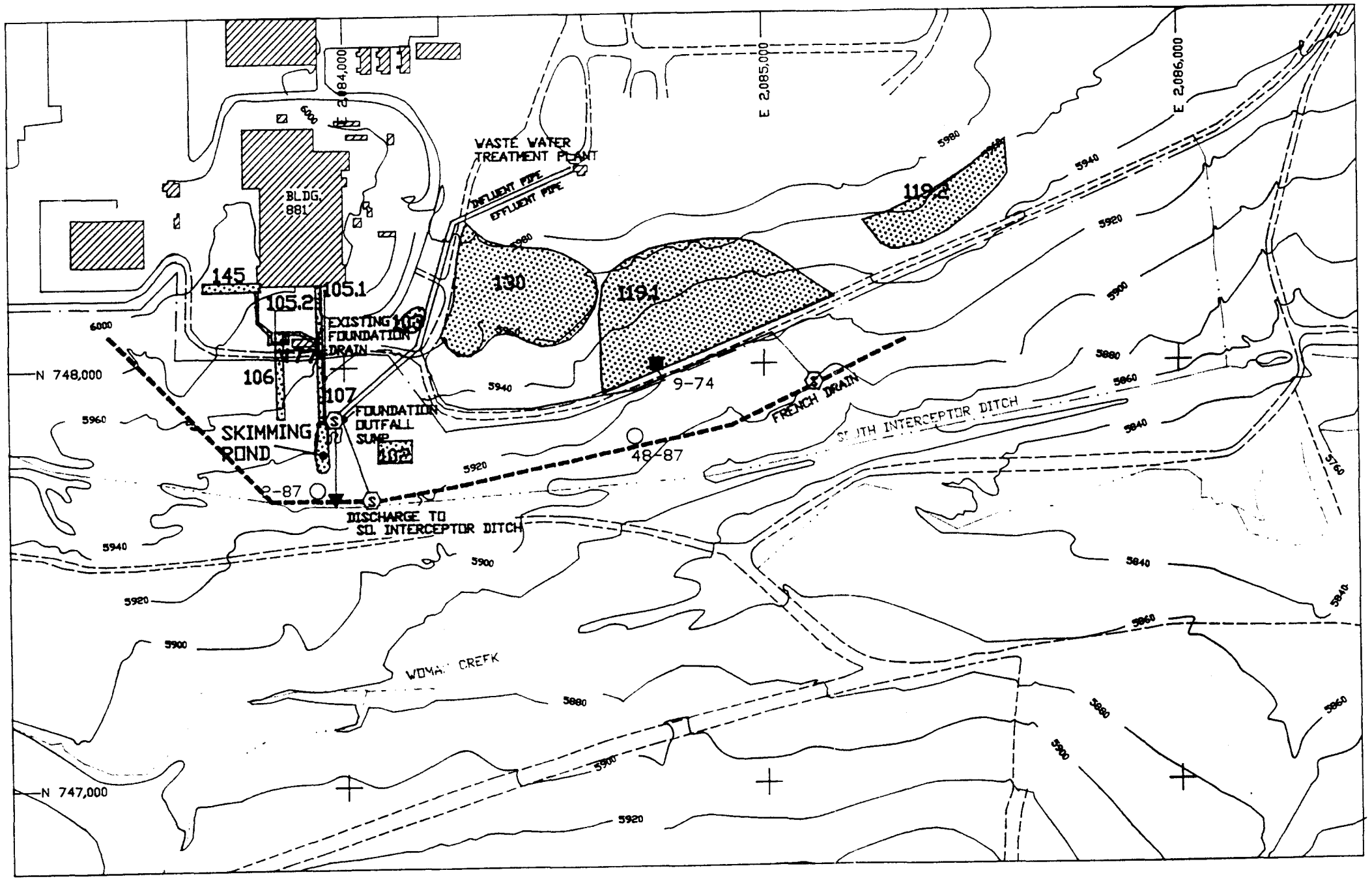
Due to the importance and short duration of this project, a focus will be placed on QA surveillance of in-progress work. Following completion of the work, the records of the work and of quality activities will be audited to ensure that comprehensive records are collected and maintained.

ROCKY FLATS ENVIRONMENTAL RESTORATION PROGRAM
REVIEW/COMMENT RESOLUTION FORM

Document No. and Title: Quality Assurance Project Plan (Construction) OU 1.1 Issue 1 Dated 5/14/90 Page 1 of 1

Reviewer Name(s): Wanda Busby (EG&G)

REVIEWER'S COMMENTS			RESPONSE
COMMENT NO.	PAGE NO.	COMMENTS	DISCUSSION
1	5	Figure 2 - Add a line to Air Programs Representative Environmental Restoration Department Director.	Line added.
2	8	Air Programs Representative - Change "or" to "of."	Replaced "or" with "of."
3	8	Air Programs Representative - Delete "(Air Programs)."	Deleted "(Air Programs)."
4	8	Add "providing meteorological data."	Added "providing meteorological data."
5	8	Quality Assurance Officer - correct reporting responsibility.	Corrected reporting responsibility to the ER Department Director.
6	10	Criterion 12 - add "be."	Added "be."



-N-

SCALE: 1"=300'

EXPLANATION

- 102 — SOLID WASTE MANAGEMENT UNITS
- FRENCH DRAIN SYSTEM
- (S) — SUMPS (location to be finalized during detail design)
- 9-74 — RECOVERY WELL
- 48-87 — ALLUVIAL MONITOR WELLS

FIGURE 5-1

FRENCH DRAIN COLLECTION WITH TREATMENT

R37017.PJ-092589